BONUS PRACTICE TEST 2

Section 1: Quantitative

1. What is 728 ÷ 52?

A. 13

B. 14

C. 15

D. 16

E. 12

2. If 6x + 27 = 99, then x =

A. 126

B. 72

C. 6

D. 12

E. 18

3. What is the greatest common factor (GCF) of 56 and 84?

A. 28

B. 14

C. 7

D. 4

E. 168

4. Evaluate: 25 + 32 ÷ 4 − 10

A. 4.25

B. 8

C. 23

D. 15

E. 18

5. What is $8^2 + 7^2$?

A. 15

B. 64

C. 49

D. 121

E. 113

6. If $p + 129 = 267$, then $p =$

A. 396

B. 138

C. 129

D. 267

E. 148

7. What is the least common multiple (LCM) of 30 and 45?

A. 15

B. 135

C. 75

D. 90

E. 60

8. Evaluate: $(20 + 16) \times 5 - 30$

A. 150

B. 180

C. 210

D. 120

E. 90

9. Which of the following is a prime number?

A. 63

B. 65

C. 67

D. 68

E. 69

10. What is 4/9 + 3/9?

A. 7/18

B. 1/9

C. 4/9

D. 3/9

E. 7/9

11. Evaluate: $210 - 19 \times 9 + 16$

A. 1719

B. 55

C. 171

D. 39

E. 1735

12. What is $|-58|$?

A. 0

B. −58

C. 116

D. 58

E. −116

13. Round 7,863 to the nearest hundred.

A. 7,900

B. 7,860

C. 7,800

D. 8,000

E. 7,870

14. What is 6/11 − 2/11?

A. 4/11

B. 8/11

C. 4/11

D. 6/11

E. 2/11

15. Evaluate: 11 × 9 + 8 × 7

A. 99

B. 56

C. 155

D. 176

E. 155

16. What is 7^3?

A. 21

B. 343

C. 49

D. 147

E. 243

17. If $b - 83 = 179$, then $b =$

A. 96

B. 83

C. 179

D. 262

E. 252

18. Which number is divisible by both 7 and 8?

A. 56

B. 42

C. 49

D. 63

E. 72

19. What is $3/7 + 3/7$?

A. 3/7

B. 9/7

C. 6/7

D. 3/14

E. 1

20. Evaluate: $160 - 15 \times 10 + 13$

A. 1513

B. 150

C. 1500

D. 23

E. 23

21. What is 4/7 × 5/8?

A. 9/15

B. 5/14

C. 20/56

D. 1/2

E. 4/8

22. Convert 9/20 to a decimal.

A. 0.9

B. 0.09

C. 0.2

D. 0.45

E. 0.92

23. What is 175% of 80?

A. 140

B. 80

C. 100

D. 160

E. 120

24. Simplify: 30/45

A. 15/45

B. 30/45

C. 2/3

D. 3/5

E. 1/2

25. What is 0.7 + 0.89?

A. 0.78

B. 1.59

C. 0.19

D. 1.69

E. 1.59

26. The ratio of apples to oranges is 4:5. If there are 20 apples, how many oranges are there?

A. 16

B. 25

C. 20

D. 15

E. 30

27. What is 45% of 220?

A. 45

B. 220

C. 88

D. 99

E. 110

28. Which is greatest: 4/5, 7/9, or 5/6?

A. 5/6

B. 7/9

C. 4/5

D. They're equal

E. Cannot determine

29. What is 4.5×0.6?

A. 27

B. 2.7

C. 2.7

D. 5.1

E. 9.0

30. A shop marks up items 80% above cost. If an item costs $90, what is the selling price?

A. $90

B. $170

C. $72

D. $180

E. $162

31. What is $5/8 \div 1/4$?

A. 5/32

B. 5/2

C. 1/2

D. 8/5

E. 5/8

32. Convert 0.08 to a fraction in simplest form.

A. 8/10

B. 4/5

C. 8/100

D. 2/25

E. 1/8

33. What percent of 75 is 30?

A. 40%

B. 30%

C. 4%

D. 75%

E. 25%

34. What is 1 2/3 + 3 1/4?

A. 4 5/7

B. 4 3/4

C. 4 11/12

D. 5 1/12

E. 4 1/2

35. If 5/8 of a number is 40, what is the number?

A. 25

B. 50

C. 80

D. 32

E. 64

36. What is the ratio of 42 to 56 in simplest form?

A. 7:8

B. 3:4

C. 6:8

D. 21:28

E. 42:56

37. What is 8.6 − 3.97?

A. 5.63

B. 4.63

C. 5.37

D. 4.63

E. 4.53

38. A jacket costs $180 after a 25% discount. What was the original price?

A. $240

B. $205

C. $225

D. $155

E. $220

39. What is 5/12 + 3/12?

A. 8/24

B. 1/2

C. 2/3

D. 5/12

E. 8/12

40. If a:b = 9:5 and a = 54, what is b?

A. 45

B. 35

C. 27

D. 25

E. 30

41. Solve for x: $4x + 13 = 45$

A. 58

B. 8

C. 32

D. 4

E. 11

42. What is the value of $5m + 4n$ when $m = 6$ and $n = 7$?

A. 41

B. 30

C. 38

D. 58

E. 52

43. If $7p - 11 = 38$, then $p =$

A. 7

B. 27

C. 49

D. 7

E. 5

44. Simplify: $6(a + 5)$

A. $6a + 5$

B. $a + 30$

C. $6a + 30$

D. $11a$

E. $6a + 11$

45. What is the value of y^2 when $y = 13$?

A. 26

B. 13

C. 39

D. 143

E. 169

46. Solve: $n/8 = 11$

A. 3

B. 88

C. 8

D. 11

E. 19

47. If $5(x + 6) = 40$, then $x =$

A. 2

B. 14

C. 8

D. 2

E. 10

48. What is $4y + 7y$?

A. 11y

B. 28y

C. $11y^2$

D. 11

E. 4y

49. Evaluate: $8t - 4t + 12$ when $t = 5$

A. 22

B. 20

C. 28

D. 32

E. 36

50. If $9c = 117$, then $c =$

A. 108

B. 126

C. 9

D. 14

E. 13

51. What is the perimeter of a square with side length 19?

A. 38

B. 76

C. 361

D. 95

E. 57

52. A rectangle has length 26 and width 15. What is its area?

A. 41

B. 82

C. 380

D. 390

E. 400

53. What is the circumference of a circle with radius 10? (Use $\pi \approx 3.14$)

A. 62.8

B. 31.4

C. 20

D. 314

E. 50

54. A triangle has base 32 and height 17. What is its area?

A. 49

B. 544

C. 272

D. 98

E. 320

55. What is the volume of a rectangular box with dimensions $7 \times 6 \times 9$?

A. 22

B. 42

C. 63

D. 252

E. 378

56. An equilateral triangle has one side of length 13. What is its perimeter?

A. 26

B. 39

C. 52

D. 13

E. 65

57. What is the area of a circle with radius 14? (Use $\pi \approx 3.14$)

A. 43.96

B. 87.92

C. 196

D. 615.44

E. 879.2

58. A rectangular garden is 45 feet long and 28 feet wide. What is its perimeter?

A. 146 feet

B. 1260 feet

C. 73 feet

D. 90 feet

E. 118 feet

59. What is the area of a parallelogram with base 24 and height 13?

A. 37

B. 288

C. 312

D. 74

E. 156

60. A cube has edge length 7. What is its volume?

A. 21

B. 49

C. 147

D. 294

E. 343

61. Maya buys 5 pens at $7 each and 4 notebooks at $4 each. How much does she spend?

A. $35

B. $51

C. $16

D. $45

E. $39

62. A train travels 315 miles in 5 hours. What is its average speed?

A. 310 mph

B. 320 mph

C. 70 mph

D. 63 mph

E. 55 mph

63. Jake has $105. He spends $32 on a shirt and $41 on shoes. How much does he have left?

A. $32

B. $73

C. $64

D. $178

E. $41

64. A factory has 224 items. If they package 16 items per box, how many boxes do they need?

A. 208

B. 16

C. 14

D. 224

E. 15

65. Lucia runs 7 laps around a track. If each lap is 600 meters, how far does she run?

A. 607 meters

B. 86 meters

C. 593 meters

D. 3600 meters

E. 4200 meters

66. A movie starts at 4:15 PM and lasts 2 hours and 35 minutes. What time does it end?

A. 6:15 PM

B. 6:50 PM

C. 7:15 PM

D. 6:35 PM

E. 7:50 PM

67. A book has 480 pages. Miguel reads 60 pages per day. How many days will it take him to finish?

A. 540 days

B. 420 days

C. 6 days

D. 8 days

E. 7 days

68. The temperature was 6°C in the morning and rose 17°C by afternoon. What was the afternoon temperature?

A. 23°C

B. −11°C

C. 102°C

D. 17°C

E. 20°C

69. A cake is cut into 12 equal slices. If Sofia eats 5 slices, what fraction of the cake remains?

A. 5/12

B. 1/2

C. 7/12

D. 5/7

E. 2/12

70. A rectangular pool is 35 meters long, 14 meters wide, and 4 meters deep. What is its volume?

A. 53 cubic meters

B. 490 cubic meters

C. 140 cubic meters

D. 196 cubic meters

E. 1960 cubic meters

71. What is the average of 19, 27, 23, and 31?

A. 100

B. 27

C. 23

D. 26

E. 25

72. A store sells calculators for $15 each. If they sell 48 calculators, how much revenue do they make?

A. $63

B. $33

C. $720

D. $720

E. $675

73. What is the median of the following numbers: 6, 13, 5, 16, 10?

A. 10

B. 13

C. 16

D. 5

E. 6

74. A sequence follows the rule: add 26. If the first term is 31, what is the 8th term?

A. 57

B. 213

C. 213

D. 239

E. 187

75. A rectangular flag is 72 inches long and 54 inches wide. What is the length of its diagonal?

A. 126 inches

B. 18 inches

C. 63 inches

D. 81 inches

E. 90 inches

76. What is the probability of rolling a number greater than 2 on a standard six-sided die?

A. 1/3

B. 2/3

C. 1/2

D. 5/6

E. 1/6

77. A car travels at 72 mph for 3 hours. How far does it travel?

A. 75 miles

B. 69 miles

C. 240 miles

D. 216 miles

E. 180 miles

78. What is the mode of the following numbers: 8, 11, 8, 15, 8, 12, 11?

A. 8

B. 11

C. 15

D. 12

E. 10

79. A baker makes 196 cupcakes and packs them in boxes of 14. How many boxes does he need?

A. 182

B. 14

C. 14

D. 196

E. 12

80. What is the range of the following numbers: 25, 33, 16, 38, 27?

A. 25

B. 33

C. 16

D. 21

E. 22

81. A triangle has angles measuring 55° and 75°. What is the measure of the third angle?

A. 130°

B. 50°

C. 180°

D. 55°

E. 75°

82. A rope 175 inches long is cut into 7 equal pieces. How long is each piece?

A. 168 inches

B. 1225 inches

C. 35 inches

D. 25 inches

E. 20 inches

83. What is the area of a trapezoid with bases 14 and 18, and height 12?

A. 192

B. 44

C. 384

D. 216

E. 168

84. A number is squared, then 25 is subtracted. The result is 75. What is the number?

A. 5

B. 8

C. 10

D. 50

E. 100

85. The perimeter of a rectangle is 78. If the length is 24, what is the width?

A. 54

B. 39

C. 102

D. 30

E. 15

86. What is 30% of 40% of 250?

A. 70

B. 30

C. 100

D. 12

E. 300

87. A bag contains 7 red, 5 blue, and 9 green marbles. What is the probability of selecting a blue marble?

A. 7/21

B. 5/21

C. 9/21

D. 5/7

E. 1/5

88. What is the surface area of a cube with edge length 6?

A. 216

B. 36

C. 72

D. 144

E. 180

89. If a pattern continues 6, 18, 54, 162, what is the next number?

A. 216

B. 324

C. 486

D. 648

E. 810

90. A store offers a 25% discount, then an additional 20% discount on the sale price. What is the final price of a $400 item?

A. $300

B. $320

C. $340

D. $280

E. $240

91. Solve for y: $7y - 18 = 5y + 12$

A. 30

B. 15

C. 6

D. 3

E. −6

92. What is the value of $m^2 - n^2$ when m = 7 and n = 5?

A. 2

B. 74

C. 49

D. 24

E. 25

93. If $4(r - 8) = 28$, then r =

A. 15

B. 36

C. 4

D. 9

E. 12

94. Simplify: $12x - 5x + 4x$

A. 3x

B. 21x

C. 11x

D. 7x

E. 16x

95. What is the value of $4n^2$ when n = 9?

A. 36

B. 81

C. 72

D. 162

E. 324

96. Solve: $3m/8 = 9$

A. 3.375

B. 24

C. 27

D. 72

E. 32

97. If $6(k + 7) = 54$, then $k =$

A. 16

B. 61

C. 9

D. 2

E. 7

98. What is $5p - 3p + 9$ when $p = 8$?

A. 25

B. 27

C. 15

D. 19

E. 32

99. If $8d = 104$, then $d =$

A. 96

B. 112

C. 13

D. 8

E. 14

100. What is the value of $(a + b)^2$ when $a = 6$ and $b = 8$?

A. 14

B. 100

C. 36

D. 64

E. 196

Section 2: Reading

Passage 1

The Rosetta Stone, discovered in Egypt in 1799, provided the key to understanding ancient Egyptian hieroglyphs. The stone contains the same text written in three scripts: Greek, Demotic, and hieroglyphics. Since scholars already knew ancient Greek, they could use it to decode the other two writing systems. French scholar Jean-François Champollion finally cracked the code in 1822, unlocking thousands of years of Egyptian history.

1. The Rosetta Stone was discovered in

A. 1822

B. 1800

C. 1799

D. 1850

E. 1775

2. The stone contains text in how many scripts?

A. one

B. two

C. four

D. five

E. three

3. Scholars could already read

A. hieroglyphics

B. ancient Greek

C. Demotic only

D. none of them

E. all of them

4. Who decoded the hieroglyphs?

A. Jean-François Champollion

B. Napoleon

C. an Egyptian priest

D. an unknown scholar

E. Rosetta

5. The stone helped unlock

A. treasure locations

B. building techniques

C. trade routes

D. Egyptian history

E. mathematical formulas

Passage 2

My sister asked me to teach her guitar. I didn't want to—I'd learned through years of frustrating practice, and she wanted instant results. But I remembered my own teacher, Mr. Harrison, who stayed patient when I couldn't get a simple chord after twenty tries. So I said yes. Three months later, she played her first song. It wasn't perfect, but watching her face light up, I understood why Mr. Harrison never gave up on me. Teaching isn't about perfection. It's about passing on possibility.

6. The narrator was reluctant because

A. she didn't like her sister

B. she was too busy

C. her sister wanted instant results

D. she didn't play guitar well

E. she had no time

7. Who taught the narrator guitar?

A. her sister

B. her parents

C. herself

D. a famous musician

E. Mr. Harrison

8. How long did it take the sister to play her first song?

A. one week

B. three months

C. one year

D. twenty days

E. six months

9. The narrator learned that teaching is about

A. passing on possibility

B. being perfect

C. making money

D. showing off skills

E. quick results

10. Mr. Harrison was

A. impatient

B. strict

C. wealthy

D. patient

E. famous

Passage 3

Bioluminescence is the production and emission of light by living organisms. Fireflies use bioluminescence to attract mates, while some deep-sea fish use it to lure prey in the dark ocean depths.

The light is produced through a chemical reaction involving luciferin (a light-emitting compound) and luciferase (an enzyme). Unlike incandescent bulbs that waste energy as heat, bioluminescence is nearly 100% efficient—almost all energy converts to light.

11. Bioluminescence is

A. artificial light

B. reflected sunlight

C. light produced by living organisms

D. heat production

E. electrical energy

12. Fireflies use bioluminescence to

A. find food

B. hide from predators

C. warm themselves

D. see in darkness

E. attract mates

13. The light is produced by a reaction involving

A. electricity and heat

B. luciferin and luciferase

C. water and oxygen

D. sunlight and chlorophyll

E. sugar and protein

14. Deep-sea fish use bioluminescence to

A. lure prey

B. communicate with surface fish

C. produce heat

D. swim faster

E. avoid predators

15. Compared to incandescent bulbs, bioluminescence is

A. less efficient

B. hotter

C. slower

D. more efficient

E. dimmer

Passage 4

Coach told me I'd be team captain. I should have been excited, but I felt sick. Being captain meant making decisions my friends might hate. It meant speaking up when others stayed quiet. The first team meeting proved me right—I had to tell Marcus he was benched for missing practice. He'd been my friend since third grade. He didn't speak to me for a week. But the team needed reliability, and rules had to mean something. Leadership isn't about being liked. It's about doing what's right for everyone, even when it hurts.

16. The narrator felt sick because

A. he was ill

B. he didn't want responsibility

C. decisions might make friends angry

D. he wasn't good enough

E. he hated the coach

17. Who did the narrator have to bench?

A. the coach

B. himself

C. a stranger

D. the entire team

E. Marcus

18. Marcus and the narrator had been friends since

A. high school

B. third grade

C. kindergarten

D. last year

E. sixth grade

19. Marcus was benched for

A. missing practice

B. playing poorly

C. arguing with coach

D. being late once

E. breaking rules

20. The narrator learned that leadership is about

A. being popular

B. avoiding conflict

C. making everyone happy

D. doing what's right for everyone

E. following orders

Passage 5

Photosynthesis occurs in plant cells' chloroplasts, where chlorophyll captures sunlight energy. Plants use this energy to convert carbon dioxide and water into glucose (food) and oxygen. The glucose provides energy for plant growth, while oxygen is released into the atmosphere. This process is essential for life on Earth—plants produce the oxygen that animals breathe, and they form the base of most food chains.

21. Photosynthesis occurs in

A. roots

B. soil

C. chloroplasts

D. stems only

E. air

22. Chlorophyll's function is to

A. produce water

B. create soil

C. release carbon dioxide

D. absorb water

E. capture sunlight energy

23. Plants convert carbon dioxide and water into

A. oxygen only

B. glucose and oxygen

C. chlorophyll and air

D. roots and leaves

E. nitrogen and heat

24. The glucose produced is used for

A. plant growth

B. attracting insects

C. producing flowers

D. making leaves green

E. creating seeds

25. Oxygen from photosynthesis

A. stays in plants

B. goes into soil

C. becomes water

D. is released into the atmosphere

E. forms carbon dioxide

Passage 6

The email subject line read: "Scholarship—Finalist." My hands shook as I opened it. I'd worked three years for this, maintaining a 4.0 while working weekends at the library. But the email requested an interview—in person, two states away, in three days. I couldn't afford the trip. I sat staring at the screen, tears blurring the words. Then Mom appeared at my door. "What's wrong?" When I showed her, she smiled. "We'll figure it out. You've worked too hard to stop now." Sometimes the hardest part isn't earning the opportunity. It's asking for help to reach it.

26. The scholarship email announced the narrator was a

A. winner

B. applicant

C. finalist

D. runner-up

E. recipient

27. The narrator had maintained what GPA?

A. 3.0

B. 3.5

C. 2.5

D. 3.8

E. 4.0

28. The interview was

A. online

B. two states away

C. at the library

D. canceled

E. next month

29. The narrator couldn't afford

A. the trip

B. the application fee

C. the school

D. to quit working

E. interview clothes

30. The narrator's mom said they would

A. give up

B. wait for next year

C. apply elsewhere

D. figure it out

E. borrow money

Passage 7

Plate tectonics theory explains Earth's surface structure. The lithosphere (outer shell) is divided into large plates that float on the semi-molten asthenosphere beneath. These plates constantly move, typically a few centimeters per year. Where plates collide, mountains form or one plate subducts under another. Where they separate, new crust forms. Earthquakes and volcanoes concentrate along plate boundaries, making these areas geologically active.

31. Earth's outer shell is called the

A. asthenosphere

B. core

C. lithosphere

D. mantle

E. crust only

32. Tectonic plates float on the

A. lithosphere

B. core

C. ocean

D. mantle

E. asthenosphere

33. Plates typically move

A. rapidly

B. a few centimeters per year

C. meters per day

D. not at all

E. kilometers per year

34. When plates collide

A. mountains can form

B. nothing happens

C. they bounce back

D. they dissolve

E. they stop moving

35. Earthquakes and volcanoes are common

A. at Earth's center

B. in the ocean only

C. everywhere equally

D. along plate boundaries

E. far from plates

Passage 8

The text came during algebra: "Can I copy your homework?" It was from Devon, who sat behind me. I'd spent an hour on those problems last night. Devon had been at Jake's party—I'd seen the photos. My fingers hovered over the keyboard. I could say yes and be the helpful friend. Or I could say no and risk him thinking I was selfish. Then I remembered my dad's words: "Real friends don't ask you to compromise your integrity." I typed: "I can help you understand the problems after school, but I can't just give you answers." He left me on read. Two days later, he texted: "Thanks for offering to help. Can we meet today?" Integrity costs something. But it's worth it.

36. The text came during

A. lunch

B. gym

C. algebra

D. history

E. after school

37. Devon asked to

A. study together

B. borrow a pencil

C. switch seats

D. meet after school

E. copy homework

38. Devon had been at

A. the library

B. Jake's party

C. work

D. home studying

E. practice

39. The narrator's dad said real friends don't ask you to compromise your

A. integrity

B. time

C. money

D. grades

E. schedule

40. Devon eventually

A. got angry

B. told the teacher

C. stopped talking to narrator

D. accepted the help offer

E. copied someone else

Passage 9

The Great Barrier Reef, off Australia's coast, is Earth's largest coral reef system, stretching over 1,400 miles. It comprises thousands of individual reefs and hundreds of islands. Coral reefs are built by tiny animals called polyps that secrete calcium carbonate, forming hard structures. These reefs support incredible biodiversity, housing thousands of species. However, rising ocean temperatures cause coral bleaching—when stressed corals expel their symbiotic algae, turning white and becoming vulnerable to death.

41. The Great Barrier Reef is located off

A. California

B. Japan

C. Australia

D. Florida

E. Hawaii

42. The reef stretches over

A. 140 miles

B. 500 miles

C. 1,000 miles

D. 2,000 miles

E. 1,400 miles

43. Coral reefs are built by

A. fish

B. polyps

C. algae only

D. minerals

E. waves

44. Polyps secrete

A. calcium carbonate

B. oxygen

C. salt

D. sugar

E. protein

45. Coral bleaching is caused by

A. too much rain

B. cold water

C. pollution only

D. rising ocean temperatures

E. overfishing

Passage 10

I found my younger brother crying in his room. "Everyone's better than me at soccer," he said. I almost gave him the usual "just practice more" speech. But I remembered being twelve, trying out for basketball, getting cut while my friends made the team. Practice hadn't fixed my height or natural coordination. Instead, I told him: "Not everyone's good at everything. Soccer might not be your thing, and that's okay. What do YOU love doing?" He thought, then said quietly, "Drawing." Within a year, his art hung in the school showcase. Sometimes the best thing we can do for someone isn't push them toward what's valued by others, but help them discover what they value themselves.

46. The younger brother was upset about

A. homework

B. friends

C. soccer

D. school

E. moving

47. The narrator almost gave the speech about

A. quitting

B. asking for help

C. trying harder

D. changing schools

E. practicing more

48. The narrator had tried out for

A. soccer

B. basketball

C. baseball

D. football

E. track

49. The brother realized he loved

A. drawing

B. music

C. writing

D. science

E. reading

50. Within a year, the brother's art

A. won a prize

B. was sold

C. appeared in magazines

D. hung in the school showcase

E. was displayed nationally

Passage 11

Antibiotics revolutionized medicine by treating bacterial infections. They work through various mechanisms: some disrupt bacterial cell wall synthesis, others interfere with protein production or DNA replication. However, bacteria can develop resistance through genetic mutations or acquiring resistance genes from other bacteria. Antibiotic overuse accelerates resistance development. When people don't complete prescribed antibiotic courses, they kill susceptible bacteria while resistant ones survive and multiply, spreading resistance.

51. Antibiotics treat

A. viruses

B. fungal infections

C. bacterial infections

D. all diseases

E. cancer

52. Some antibiotics work by disrupting

A. human cells

B. blood flow

C. oxygen levels

D. immune response

E. bacterial cell wall synthesis

53. Bacteria develop resistance through

A. diet changes

B. genetic mutations

C. exercise

D. temperature changes

E. water intake

54. Antibiotic resistance is accelerated by

A. overuse

B. proper use

C. vaccines

D. exercise

E. nutrition

55. Not completing antibiotic courses can cause

A. immediate cure

B. no effect

C. faster healing

D. resistant bacteria to multiply

E. all bacteria to die

Passage 12

The college acceptance letter came. Full scholarship to State. I should have been celebrating, but I felt hollow. This was Plan B—my safety school. Plan A was Elite University, the place I'd dreamed about since eighth grade. I hadn't heard from them yet. My counselor, Mrs. Chen, found me in the hallway. "I heard about State. Congratulations." I must have looked miserable because she added, "You know what makes a school good? What YOU do there. Elite is a name. State is an opportunity. Choose which matters more." Two weeks later, Elite accepted me. I chose State. Three years in, I know I made the right choice. Dreams matter less than what you build from where you are.

56. The narrator received a scholarship from

A. Elite University

B. a local college

C. State

D. a community college

E. an online school

57. Plan A was

A. State

B. working

C. community college

D. taking a year off

E. Elite University

58. Who found the narrator in the hallway?

A. a friend

B. Mrs. Chen

C. a parent

D. the principal

E. a teacher

59. Mrs. Chen said good schools are defined by

A. rankings

B. reputation

C. prestige

D. price

E. what you do there

60. The narrator has been at State for

A. one month

B. one year

C. two years

D. three years

E. four years

Passage 13

Metamorphosis is a biological process where an organism physically transforms after birth or hatching. Complete metamorphosis, seen in butterflies, involves four stages: egg, larva (caterpillar), pupa (chrysalis), and adult. Inside the chrysalis, the caterpillar's body breaks down and reorganizes into a butterfly—a process called histolysis and histogenesis. Incomplete metamorphosis, seen in grasshoppers, has three stages: egg, nymph, and adult. Nymphs resemble small adults and gradually develop adult features through successive molts.

61. Metamorphosis is

A. a disease

B. a type of movement

C. physical transformation

D. learning behavior

E. migration

62. Complete metamorphosis has how many stages?

A. two

B. three

C. five

D. six

E. four

63. A butterfly's larva is called a

A. nymph

B. caterpillar

C. pupa

D. chrysalis

E. egg

64. Inside the chrysalis, the caterpillar undergoes

A. histolysis and histogenesis

B. photosynthesis

C. respiration

D. digestion

E. reproduction

65. Incomplete metamorphosis is seen in

A. butterflies

B. moths

C. beetles

D. grasshoppers

E. flies

Passage 14

My grandmother taught me to bake bread every Sunday. Not from a mix—from flour, water, yeast, salt. "You have to feel the dough," she'd say. "It tells you what it needs." I didn't understand. Recipes were about measurements, not feelings. Then one Sunday, she had a stroke. Three months later, I tried baking alone. The recipe was perfect, but the bread came out wrong. Too dense. Flavorless. I tried again. And again. By the tenth attempt, I understood. The humidity affected the flour. The temperature changed the yeast's behavior. My hands learned what my grandmother's hands had known. The next loaf was perfect. She couldn't taste it—she'd passed two weeks before—but somehow, I think she knew.

66. The grandmother taught the narrator to bake

A. cakes

B. cookies

C. bread

D. pies

E. brownies

67. The grandmother said you have to

A. follow recipes exactly

B. measure precisely

C. bake quickly

D. use a thermometer

E. feel the dough

68. After the grandmother's stroke, the narrator

A. stopped baking

B. baked perfectly immediately

C. gave up

D. found it easy

E. struggled initially

69. The narrator learned that baking is affected by

A. the day of the week

B. the baker's mood

C. the kitchen color

D. who's watching

E. humidity and temperature

70. By the tenth attempt

A. the narrator quit

B. the bread was burned

C. the recipe changed

D. the bread was perfect

E. nothing improved

Passage 15

The water cycle describes water's continuous movement through Earth's systems. Evaporation converts liquid water to vapor, which rises into the atmosphere. Transpiration is water vapor released by plants. Condensation occurs when water vapor cools and forms clouds. Precipitation (rain, snow, sleet) returns water to Earth's surface. Water then flows into streams and rivers (runoff), soaks into ground (infiltration), or collects in lakes and oceans, where the cycle repeats.

71. The water cycle describes water's

A. creation

B. destruction

C. continuous movement

D. color changes

E. temperature

72. Evaporation converts liquid water to

A. ice

B. clouds

C. rain

D. steam

E. vapor

73. Transpiration is water vapor released by

A. animals

B. plants

C. rocks

D. clouds

E. oceans

74. Condensation occurs when water vapor

A. cools and forms clouds

B. heats up

C. falls as rain

D. enters the ground

E. evaporates

75. Precipitation includes

A. evaporation only

B. condensation only

C. transpiration only

D. rain, snow, and sleet

E. infiltration only

Passage 16

The notification said I'd been tagged in a photo. I clicked. It was from last Friday's party—me in the background, looking awkward while everyone else laughed at something I'd missed. Caption: "When

you're the only one who doesn't get the joke 😂." Forty-three likes already. My face burned. I could delete the tag, but everyone had already seen it. I could comment something funny, play along, pretend it didn't hurt. Then my phone rang. It was Ava, who'd posted it. "Hey, I'm taking that down. My little sister just showed me and said it was mean. I wasn't thinking. I'm sorry." The post disappeared. The hurt didn't, not immediately. But it mattered that she tried.

76. The narrator had been tagged in

A. a video

B. a story

C. a photo

D. a comment

E. a post

77. The photo was from

A. last month

B. yesterday

C. last year

D. today

E. last Friday

78. The caption made the narrator feel

A. proud

B. hurt

C. excited

D. happy

E. indifferent

79. Who posted the photo?

A. Ava

B. a stranger

C. the narrator

D. Ava's sister

E. a teacher

80. Ava's little sister said the post was

A. funny

B. perfect

C. boring

D. mean

E. unclear

Passage 17

Black holes form when massive stars collapse at the end of their lives. Their gravitational pull is so intense that nothing, not even light, can escape once it crosses the event horizon (the point of no return). We can't see black holes directly, but we detect them by observing their effects on nearby matter. Matter spiraling into a black hole forms an accretion disk that emits X-rays. Scientists recently captured the first black hole image using the Event Horizon Telescope, showing a glowing ring of light around a dark center.

81. Black holes form when

A. planets collide

B. comets explode

C. massive stars collapse

D. galaxies merge

E. moons break apart

82. The event horizon is

A. a telescope

B. a type of star

C. a planet

D. the outer edge of a galaxy

E. the point of no return

83. We detect black holes by

A. seeing them directly

B. observing effects on nearby matter

C. hearing sounds

D. measuring temperature

E. analyzing colors

84. Matter spiraling into a black hole forms

A. an accretion disk

B. a new star

C. a planet

D. a comet

E. a moon

85. The Event Horizon Telescope captured

A. nothing

B. a comet

C. a planet

D. the first black hole image

E. a supernova

Passage 18

"You're being dramatic," my older sister said when I told her I was nervous about ninth grade. She was a junior, confident, popular. Of course she didn't understand. But the first day, I got lost trying to find my locker. A senior saw me near tears and walked me to the office, helped me get a map, then showed me where my locker was. Her name was Sarah. I never saw her again after that day—different lunch periods, different grade. But I remembered. So now I'm a junior, and yesterday I saw a ninth-grader crying by the

lockers. I did what Sarah did. I don't know if that girl will remember me. But maybe someday she'll help someone else. Kindness isn't always about the person you help. Sometimes it's about starting a chain.

86. The narrator was nervous about

A. eighth grade

B. college

C. ninth grade

D. graduation

E. summer

87. The narrator's sister was a

A. senior

B. freshman

C. sophomore

D. graduate

E. junior

88. On the first day, the narrator couldn't find her

A. classroom

B. locker

C. lunch room

D. friends

E. schedule

89. Who helped the narrator?

A. her sister

B. a teacher

C. the principal

D. a friend

E. Sarah

90. Now the narrator is a

A. senior

B. freshman

C. sophomore

D. junior

E. graduate

Passage 19

Vaccines work by training the immune system to recognize pathogens without causing disease. They contain weakened, killed, or partial pathogens (or mRNA instructions to make pathogen proteins). When introduced, the immune system produces antibodies and memory cells. If the person later encounters the actual pathogen, memory cells rapidly produce antibodies, preventing or reducing illness. Herd immunity occurs when enough people are vaccinated that disease spread becomes difficult, protecting those who cannot be vaccinated.

91. Vaccines train the

A. brain

B. muscles

C. immune system

D. digestive system

E. respiratory system

92. Vaccines contain

A. live, strong pathogens

B. antibiotics

C. vitamins

D. minerals

E. weakened or killed pathogens

93. Memory cells

A. forget pathogens quickly

B. rapidly produce antibodies when needed

C. cause disease

D. weaken immunity

E. have no function

94. Herd immunity protects

A. those who cannot be vaccinated

B. only vaccinated individuals

C. animals only

D. no one

E. pathogens

95. When encountering a pathogen after vaccination, memory cells

A. do nothing

B. cause severe illness

C. destroy immune system

D. rapidly produce antibodies

E. forget the pathogen

Passage 20

My dad lost his job in March. He didn't tell us for two weeks—just left for "work" every morning, spent the day at the library applying for jobs. Mom figured it out when a bill collector called. I expected yelling. Instead, she hugged him. "We'll figure it out," she said. The same words I'd heard her say to me a hundred times. That night at dinner, Dad apologized to us kids. "I should have told you. I was ashamed." My little brother, who's eight, said, "But you didn't do anything wrong. Companies lay people off." Dad's eyes got watery. "When did you get so smart?" "Mom," my brother said. My dad got a job five months later. It paid less, but he seemed lighter somehow. I learned something that year: strength isn't pretending everything's fine. It's letting people help carry what's heavy.

96. The narrator's dad lost his job in

A. January

B. July

C. March

D. December

E. June

97. The dad pretended to go to work but actually went to the

A. park

B. gym

C. mall

D. coffee shop

E. library

98. When Mom found out, she

A. got angry

B. hugged him

C. cried

D. left

E. yelled

99. The narrator's younger brother is

A. five

B. six

C. seven

D. ten

E. eight

100. The dad got a new job after

A. one month

B. two years

C. one week

D. five months

E. one year

Section 3: Verbal

SYNONYMS (Questions 1-50)

Directions: Each question consists of one word followed by five words or phrases. Select the word or phrase whose meaning is closest to the word in capital letters.

1. RADIANT:

A. dull

B. dark

C. heavy

D. bright

E. quiet

2. VITAL:

A. essential

B. optional

C. unnecessary

D. trivial

E. minor

3. SERENE:

A. stormy

B. noisy

C. calm

D. busy

E. chaotic

4. FLUENT:

A. hesitant

B. slow

C. inarticulate

D. confused

E. articulate

5. BANAL:

A. exciting

B. ordinary

C. unique

D. thrilling

E. magical

6. STURDY:

A. weak

B. frail

C. delicate

D. strong

E. fragile

7. ANCIENT:

A. old

B. modern

C. new

D. contemporary

E. recent

8. PONDER:

A. ignore

B. dismiss

C. consider

D. reject

E. avoid

9. ARDENT:

A. cold

B. indifferent

C. apathetic

D. uncaring

E. passionate

10. OBSCURE:

A. clear

B. vague

C. obvious

D. definite

E. certain

11. TRANQUIL:

A. agitated

B. worried

C. anxious

D. peaceful

E. troubled

12. EVIDENT:

A. obvious

B. hidden

C. concealed

D. invisible

E. obscure

13. PETTY:

A. major

B. significant

C. trivial

D. crucial

E. vital

14. GENEROUS:

A. mean

B. cruel

C. harsh

D. stingy

E. kind

15. INERT:

A. active

B. inactive

C. energetic

D. lively

E. busy

16. BARREN:

A. fertile

B. lush

C. humid

D. sterile

E. productive

17. MONOTONOUS:

A. boring

B. exciting

C. thrilling

D. interesting

E. engaging

18. THRIFTY:

A. wasteful

B. extravagant

C. economical

D. lavish

E. generous

19. IMMACULATE:

A. dirty

B. soiled

C. polluted

D. stained

E. spotless

20. FOREBODING:

A. promising

B. threatening

C. hopeful

D. encouraging

E. positive

21. DARING:

A. timid

B. fearful

C. shy

D. bold

E. hesitant

22. SPARSE:

A. scanty

B. abundant

C. plentiful

D. generous

E. ample

23. FORTHRIGHT:

A. deceptive

B. dishonest

C. frank

D. secretive

E. evasive

24. FANCIFUL:

A. serious

B. stern

C. grave

D. solemn

E. imaginative

25. ANTIQUATED:

A. modern

B. outdated

C. current

D. new

E. contemporary

26. COURAGEOUS:

A. cowardly

B. fearful

C. timid

D. brave

E. weak

27. NUANCED:

A. subtle

B. obvious

C. blatant

D. clear

E. apparent

28. COMPASSION:

A. indifference

B. apathy

C. sympathy

D. cruelty

E. harshness

29. FERVENT:

A. lazy

B. apathetic

C. indifferent

D. bored

E. enthusiastic

30. RIGID:

A. lenient

B. strict

C. relaxed

D. loose

E. permissive

31. INHERENT:

A. learned

B. acquired

C. taught

D. inborn

E. developed

32. PROFITABLE:

A. lucrative

B. unprofitable

C. losing

D. costly

E. expensive

33. VOLATILE:

A. stable

B. steady

C. unpredictable

D. regular

E. constant

34. SERENE:

A. stormy

B. turbulent

C. agitated

D. violent

E. calm

35. BARREN:

A. crowded

B. desolate

C. populated

D. busy

E. thriving

36. ABUNDANT:

A. insufficient

B. scarce

C. limited

D. plentiful

E. meager

37. SUCCINCT:

A. brief

B. wordy

C. lengthy

D. verbose

E. rambling

38. INDUSTRIOUS:

A. lazy

B. careless

C. diligent

D. negligent

E. idle

39. POINTLESS:

A. successful

B. productive

C. effective

D. worthwhile

E. futile

40. SOCIABLE:

A. shy

B. gregarious

C. withdrawn

D. reserved

E. antisocial

41. UNSTABLE:

A. steady

B. constant

C. reliable

D. volatile

E. fixed

42. FRIENDLY:

A. cordial

B. hostile

C. unfriendly

D. cold

E. icy

43. APPROACHING:

A. distant

B. remote

C. imminent

D. far

E. unlikely

44. TRIVIAL:

A. serious

B. important

C. grave

D. significant

E. frivolous

45. PRECISE:

A. careless

B. meticulous

C. sloppy

D. negligent

E. reckless

46. WORDY:

A. silent

B. concise

C. brief

D. verbose

E. terse

47. PERSISTENT:

A. tenacious

B. weak

C. yielding

D. flexible

E. giving

48. COMPETENT:

A. incompetent

B. inexperienced

C. proficient

D. amateur

E. novice

49. GLOOMY:

A. cheerful

B. bright

C. happy

D. joyful

E. somber

50. OUTSTANDING:

A. poor

B. exemplary

C. mediocre

D. average

E. inferior

ANALOGIES (Questions 51-100)

Directions: The following questions ask you to find relationships between words. For each question, select the answer choice that best completes the meaning of the sentence.

51. Pencil is to write as

A. table is to sit

B. chair is to stand

C. brush is to paint

D. glass is to eat

E. fork is to drink

52. Tall is to short as

A. big is to large

B. fast is to quick

C. happy is to glad

D. hot is to cold

E. wide is to broad

53. Lawyer is to courthouse as

A. farmer is to barn

B. doctor is to hospital

C. pilot is to hangar

D. chef is to restaurant

E. teacher is to library

54. Branch is to tree as

A. trunk is to car

B. root is to ground

C. bark is to wood

D. arm is to body

E. fruit is to seed

55. Excited is to thrilled as

A. angry is to furious

B. tired is to energetic

C. sad is to happy

D. hungry is to full

E. hot is to cold

56. Spider is to web as

A. fish is to water

B. dog is to house

C. beaver is to dam

D. cat is to tree

E. horse is to stable

57. Paragraph is to essay as

A. word is to sentence

B. letter is to word

C. title is to story

D. page is to chapter

E. verse is to song

58. Saw is to wood as

A. pencil is to paper

B. scissors is to paper

C. knife is to plate

D. fork is to spoon

E. hammer is to nail

59. Autumn is to harvest as

A. spring is to fall

B. season is to year

C. month is to week

D. spring is to planting

E. winter is to summer

60. Handlebars is to bicycle as

A. steering wheel is to car

B. pedal is to bike

C. engine is to train

D. wing is to airplane

E. wheel is to bus

61. Poet is to poem as

A. painter is to gallery

B. sculptor is to museum

C. playwright is to play

D. actor is to theater

E. director is to studio

62. Acorn is to oak as

A. pine cone is to tree

B. flower is to petal

C. caterpillar is to butterfly

D. tadpole is to frog

E. seed is to maple

63. Museum is to artifacts as

A. school is to students

B. zoo is to animals

C. hospital is to doctors

D. store is to customers

E. theater is to actors

64. Laugh is to joy as

A. cry is to tears

B. yawn is to tired

C. wink is to eye

D. cry is to sadness

E. smile is to teeth

65. Barometer is to pressure as

A. thermometer is to temperature

B. telescope is to stars

C. microscope is to germs

D. compass is to direction

E. ruler is to length

66. Scepter is to king as

A. ring is to finger

B. necklace is to neck

C. badge is to officer

D. bracelet is to wrist

E. watch is to time

67. Flood is to water as

A. storm is to wind

B. earthquake is to ground

C. fire is to heat

D. tornado is to air

E. blizzard is to snow

68. Designer is to dress as

A. teacher is to student

B. architect is to building

C. doctor is to patient

D. farmer is to crop

E. chef is to meal

69. Seed is to sprout as

A. petal is to rose

B. stem is to leaf

C. root is to soil

D. egg is to chick

E. fruit is to tree

70. Screen is to television as

A. windshield is to car

B. film is to movie

C. mirror is to reflection

D. glass is to window

E. lens is to camera

71. Stanza is to poem as

A. verse is to poetry

B. chapter is to novel

C. movement is to symphony

D. scene is to play

E. paragraph is to essay

72. Larva is to beetle as

A. kitten is to cat

B. puppy is to dog

C. calf is to cow

D. chick is to chicken

E. tadpole is to frog

73. Howl is to wolf as

A. chirp is to cricket

B. roar is to lion

C. hiss is to snake

D. meow is to cat

E. buzz is to bee

74. Peninsula is to land as

A. mountain is to valley

B. river is to forest

C. lake is to pond

D. bay is to water

E. island is to ocean

75. Promotion is to employee as

A. graduation is to student

B. birthday is to child

C. wedding is to couple

D. anniversary is to marriage

E. retirement is to worker

76. Scalpel is to surgeon as

A. hammer is to builder

B. microscope is to biologist

C. wrench is to mechanic

D. telescope is to astronomer

E. easel is to painter

77. Preface is to afterword as

A. introduction is to conclusion

B. beginning is to end

C. start is to finish

D. opening is to closing

E. dawn is to dusk

78. Ingredient is to recipe as

A. map is to atlas

B. note is to melody

C. song is to album

D. chapter is to book

E. poem is to anthology

79. Study is to exam as

A. train is to teach

B. prepare is to ready

C. review is to test

D. rehearse is to performance

E. learn is to school

80. Painter is to canvas as

A. writer is to paper

B. sculptor is to clay

C. potter is to wheel

D. musician is to instrument

E. dancer is to stage

81. Flock is to birds as

A. fleet is to ships

B. bouquet is to flowers

C. pack is to wolves

D. school is to fish

E. forest is to trees

82. Tornado is to wind as

A. rain is to cloud

B. fog is to mist

C. thunder is to lightning

D. hail is to ice

E. avalanche is to snow

83. Jury is to jurors as

A. team is to players

B. choir is to singers

C. class is to students

D. crew is to sailors

E. cast is to actors

84. Easel is to painting as

A. canvas is to paint

B. brush is to stroke

C. frame is to art

D. loom is to weaving

E. chisel is to sculpture

85. Shell is to egg as

A. husk is to corn

B. nest is to bird

C. burrow is to rabbit

D. hive is to bee

E. pod is to pea

86. Binoculars is to near as

A. glasses is to clear

B. magnifying glass is to large

C. telescope is to distant

D. camera is to photo

E. microscope is to tiny

87. Deluge is to rain as

A. breeze is to wind

B. drizzle is to water

C. shower is to drops

D. sprinkle is to mist

E. downpour is to water

88. Auditorium is to performances as

A. library is to books

B. laboratory is to experiments

C. museum is to history

D. stadium is to sports

E. theater is to plays

89. Murmur is to shout as

A. walk is to run

B. speak is to talk

C. talk is to speak

D. whisper is to yell

E. murmur is to say

90. Scale is to weight as

A. speedometer is to speed

B. ruler is to length

C. clock is to time

D. compass is to direction

E. thermometer is to temperature

91. Buy is to sell as

A. purchase is to buy

B. trade is to exchange

C. import is to export

D. receive is to send

E. take is to get

92. Dermatologist is to skin as

A. cardiologist is to heart

B. dentist is to teeth

C. pediatrician is to children

D. neurologist is to brain

E. optometrist is to eyes

93. Brake is to car as

A. rudder is to boat

B. anchor is to ship

C. wheel is to bus

D. propeller is to plane

E. saddle is to horse

94. Core is to apple as

A. shell is to nut

B. peel is to orange

C. rind is to watermelon

D. pit is to peach

E. husk is to corn

95. Limerick is to poem as

A. novel is to fiction

B. short story is to prose

C. haiku is to poetry

D. essay is to writing

E. biography is to nonfiction

96. Melt is to solid as

A. freeze is to liquid

B. boil is to steam

C. evaporate is to liquid

D. condense is to gas

E. solidify is to liquid

97. Standing ovation is to excellence as

A. cheer is to excitement

B. boo is to disapproval

C. laugh is to humor

D. cry is to sadness

E. applause is to approval

98. Stopwatch is to time as

A. map is to location

B. odometer is to distance

C. watch is to hour

D. ruler is to length

E. calendar is to date

99. Foreword is to book as

A. title is to chapter

B. heading is to section

C. caption is to picture

D. preface is to document

E. label is to product

100. Intern is to doctor as

A. apprentice is to master

B. child is to parent

C. novice is to expert

D. employee is to boss

E. follower is to leader

Section 4: Quantitative

1. What is 864 ÷ 48?

A. 16

B. 17

C. 18

D. 19

E. 20

2. If 7x + 31 = 108, then x =

A. 11

B. 139

C. 7

D. 31

E. 15

3. What is the greatest common factor (GCF) of 63 and 81?

A. 3

B. 7

C. 21

D. 63

E. 9

4. Evaluate: 28 + 36 ÷ 4 − 12

A. 4

B. 25

C. 19

D. 16

E. 28

5. What is $10^2 - 8^2$?

A. 2

B. 4

C. 100

D. 36

E. 64

6. If q + 143 = 289, then q =

A. 432

B. 143

C. 146

D. 289

E. 156

7. What is the least common multiple (LCM) of 32 and 48?

A. 96

B. 16

C. 192

D. 64

E. 48

8. Evaluate: (22 + 18) × 6 − 35

A. 205

B. 240

C. 275

D. 170

E. 205

9. Which of the following is a prime number?

A. 69

B. 71

C. 72

D. 74

E. 75

10. What is 5/11 + 4/11?

A. 9/22

B. 1/11

C. 5/11

D. 9/11

E. 4/11

11. Evaluate: $240 - 21 \times 10 + 18$

A. 2398

B. 2380

C. 48

D. 30

E. 210

12. What is $|-67|$?

A. 67

B. −67

C. 0

D. 134

E. −134

13. Round 6,749 to the nearest hundred.

A. 6,700

B. 6,750

C. 7,000

D. 6,740

E. 6,800

14. What is 7/13 − 3/13?

A. 4/13

B. 4/13

C. 10/13

D. 7/13

E. 3/13

15. Evaluate: 12 × 11 + 9 × 8

A. 132

B. 72

C. 204

D. 204

E. 240

16. What is 8^3?

A. 24

B. 64

C. 512

D. 256

E. 384

17. If n − 91 = 203, then n =

A. 294

B. 112

C. 91

D. 203

E. 284

18. Which number is divisible by both 9 and 8?

A. 63

B. 64

C. 70

D. 81

E. 72

19. What is 4/9 + 4/9?

A. 4/9

B. 8/9

C. 1

D. 2/9

E. 4/18

20. Evaluate: 180 − 16 × 11 + 14

A. 2010

B. 176

C. 1996

D. 18

E. 16

21. What is 6/11 × 4/9?

A. 10/20

B. 24/99

C. 8/33

D. 1/2

E. 6/9

22. Convert 11/25 to a decimal.

A. 0.44

B. 0.11

C. 0.25

D. 0.55

E. 0.04

23. What is 185% of 90?

A. 185

B. 90

C. 150

D. 180

E. 166.5

24. Simplify: 33/44

A. 11/44

B. 3/4

C. 33/44

D. 2/3

E. 1/2

25. What is 1.2 + 0.89?

A. 1.19

B. 2.09

C. 0.31

D. 2.09

E. 2.19

26. The ratio of roses to tulips is 6:7. If there are 24 roses, how many tulips are there?

A. 21

B. 32

C. 28

D. 18

E. 35

27. What is 55% of 260?

A. 143

B. 260

C. 130

D. 165

E. 110

28. Which is greatest: 5/6, 8/9, or 7/8?

A. 5/6

B. 7/8

C. They're equal

D. Cannot determine

E. 8/9

29. What is 5.4 × 0.7?

A. 37.8

B. 3.78

C. 0.378

D. 6.1

E. 10.8

30. A shop marks up items 90% above cost. If an item costs $100, what is the selling price?

A. $100

B. $190

C. $90

D. $190

E. $180

31. What is 7/9 ÷ 1/3?

A. 7/27

B. 1/3

C. 7/3

D. 9/7

E. 7/9

32. Convert 0.09 to a fraction in simplest form.

A. 9/100

B. 9/10

C. 1/9

D. 3/50

E. 1/10

33. What percent of 80 is 32?

A. 32%

B. 80%

C. 4%

D. 25%

E. 40%

34. What is 2 3/4 + 4 1/3?

A. 6 7/12

B. 7 1/12

C. 6 1/2

D. 7 1/3

E. 6 3/4

35. If 6/7 of a number is 42, what is the number?

A. 36

B. 54

C. 72

D. 49

E. 63

36. What is the ratio of 48 to 64 in simplest form?

A. 6:8

B. 12:16

C. 3:4

D. 48:64

E. 24:32

37. What is 9.7 − 4.85?

A. 4.85

B. 5.85

C. 5.15

D. 4.15

E. 4.75

38. A jacket costs $200 after a 20% discount. What was the original price?

A. $240

B. $220

C. $235

D. $180

E. $250

39. What is 7/15 + 4/15?

A. 11/30

B. 11/15

C. 7/15

D. 4/15

E. 3/5

40. If m:n = 8:5 and m = 64, what is n?

A. 45

B. 35

C. 32

D. 40

E. 25

41. Solve for y: $5y + 17 = 52$

A. 69

B. 35

C. 7

D. 5

E. 10

42. What is the value of $6p + 5q$ when $p = 7$ and $q = 8$?

A. 82

B. 42

C. 40

D. 88

E. 62

43. If $8r - 13 = 43$, then $r =$

A. 30

B. 56

C. 8

D. 50

E. 7

44. Simplify: $7(b + 6)$

A. $7b + 6$

B. $7b + 42$

C. $b + 42$

D. $13b$

E. $7b + 13$

45. What is the value of z^2 when $z = 14$?

A. 28

B. 14

C. 42

D. 196

E. 182

46. Solve: $m/9 = 13$

A. 4

B. 22

C. 117

D. 9

E. 13

47. If $6(x + 7) = 48$, then $x =$

A. 1

B. 15

C. 8

D. 7

E. 6

48. What is $5w + 8w$?

A. $5w$

B. $13w^2$

C. 13

D. $8w$

E. 13w

49. Evaluate: 9s − 5s + 15 when s = 6

A. 27

B. 39

C. 21

D. 45

E. 33

50. If 11d = 143, then d =

A. 132

B. 154

C. 11

D. 13

E. 15

51. What is the perimeter of a square with side length 21?

A. 42

B. 441

C. 84

D. 63

E. 105

52. A rectangle has length 29 and width 17. What is its area?

A. 46

B. 92

C. 480

D. 500

E. 493

53. What is the circumference of a circle with radius 11? (Use $\pi \approx 3.14$)

A. 34.54

B. 22

C. 379.94

D. 55

E. 69.08

54. A triangle has base 36 and height 19. What is its area?

A. 55

B. 342

C. 684

D. 110

E. 380

55. What is the volume of a rectangular box with dimensions $8 \times 7 \times 10$?

A. 25

B. 56

C. 80

D. 560

E. 630

56. An equilateral triangle has one side of length 15. What is its perimeter?

A. 30

B. 60

C. 45

D. 15

E. 75

57. What is the area of a circle with radius 15? (Use $\pi \approx 3.14$)

A. 706.5

B. 94.2

C. 225

D. 942

E. 471

58. A rectangular yard is 50 feet long and 32 feet wide. What is its perimeter?

A. 82 feet

B. 1600 feet

C. 100 feet

D. 150 feet

E. 164 feet

59. What is the area of a parallelogram with base 28 and height 15?

A. 43

B. 420

C. 56

D. 210

E. 392

60. A cube has edge length 8. What is its volume?

A. 24

B. 64

C. 192

D. 512

E. 384

61. Noah buys 6 pens at $8 each and 5 notebooks at $5 each. How much does he spend?

A. $48

B. $25

C. $73

D. $80

E. $53

62. A bus travels 350 miles in 5 hours. What is its average speed?

A. 70 mph

B. 75 mph

C. 60 mph

D. 65 mph

E. 55 mph

63. Sarah has $118. She spends $36 on a game and $45 on a book. How much does she have left?

A. $82

B. $73

C. $81

D. $199

E. $37

64. A factory has 256 items. If they package 16 items per box, how many boxes do they need?

A. 240

B. 16

C. 272

D. 256

E. 15

65. Carlos runs 8 laps around a track. If each lap is 700 meters, how far does he run?

A. 708 meters

B. 88 meters

C. 692 meters

D. 5600 meters

E. 4900 meters

66. A concert starts at 5:20 PM and lasts 3 hours and 25 minutes. What time does it end?

A. 8:20 PM

B. 8:25 PM

C. 8:45 PM

D. 9:05 PM

E. 8:55 PM

67. A book has 540 pages. Isabella reads 60 pages per day. How many days will it take her to finish?

A. 9 days

B. 600 days

C. 480 days

D. 10 days

E. 8 days

68. The temperature was 4°C in the morning and rose 19°C by afternoon. What was the afternoon temperature?

A. 15°C

B. −15°C

C. 76°C

D. 19°C

E. 23°C

69. A pizza is cut into 16 equal slices. If Alex eats 6 slices, what fraction of the pizza remains?

A. 6/16

B. 5/8

C. 3/8

D. 10/16

E. 1/2

70. A rectangular pool is 40 meters long, 16 meters wide, and 5 meters deep. What is its volume?

A. 61 cubic meters

B. 640 cubic meters

C. 200 cubic meters

D. 3200 cubic meters

E. 80 cubic meters

71. What is the average of 20, 28, 24, and 32?

A. 104

B. 28

C. 26

D. 24

E. 30

72. A store sells tablets for $18 each. If they sell 52 tablets, how much revenue do they make?

A. $936

B. $70

C. $34

D. $900

E. $972

73. What is the median of the following numbers: 7, 14, 6, 17, 11?

A. 11

B. 14

C. 17

D. 6

E. 7

74. A sequence follows the rule: add 29. If the first term is 35, what is the 9th term?

A. 64

B. 267

C. 238

D. 296

E. 209

75. A rectangular flag is 80 inches long and 60 inches wide. What is the length of its diagonal?

A. 140 inches

B. 20 inches

C. 70 inches

D. 100 inches

E. 120 inches

76. What is the probability of rolling a number greater than 4 on a standard six-sided die?

A. 1/2

B. 2/3

C. 1/3

D. 5/6

E. 1/6

77. A car travels at 78 mph for 4 hours. How far does it travel?

A. 312 miles

B. 82 miles

C. 74 miles

D. 280 miles

E. 360 miles

78. What is the mode of the following numbers: 9, 12, 9, 16, 9, 13, 12?

A. 12

B. 16

C. 13

D. 11

E. 9

79. A baker makes 224 cookies and packs them in boxes of 16. How many boxes does she need?

A. 208

B. 14

C. 240

D. 224

E. 13

80. What is the range of the following numbers: 27, 35, 18, 40, 29?

A. 27

B. 35

C. 18

D. 22

E. 24

81. A triangle has angles measuring 60° and 75°. What is the measure of the third angle?

A. 135°

B. 180°

C. 45°

D. 60°

E. 75°

82. A rope 196 inches long is cut into 7 equal pieces. How long is each piece?

A. 28 inches

B. 1372 inches

C. 35 inches

D. 25 inches

E. 20 inches

83. What is the area of a trapezoid with bases 16 and 20, and height 14?

A. 50

B. 504

C. 280

D. 224

E. 252

84. A number is squared, then 30 is subtracted. The result is 90. What is the number?

A. 6

B. approximately 11

C. 60

D. 120

E. 10

85. The perimeter of a rectangle is 90. If the length is 27, what is the width?

A. 63

B. 45

C. 117

D. 18

E. 24

86. What is 35% of 45% of 280?

A. 126

B. 98

C. 44.1

D. 157.5

E. 70

87. A bag contains 8 red, 6 blue, and 10 green marbles. What is the probability of selecting a green marble?

A. 5/12

B. 8/24

C. 6/24

D. 10/24

E. 1/3

88. What is the surface area of a cube with edge length 7?

A. 49

B. 343

C. 84

D. 147

E. 294

89. If a pattern continues 7, 21, 63, 189, what is the next number?

A. 252

B. 567

C. 378

D. 756

E. 945

90. A store offers a 30% discount, then an additional 25% discount on the sale price. What is the final price of a $500 item?

A. $350

B. $375

C. $400

D. $262.50

E. $275

91. Solve for x: $8x - 20 = 6x + 14$

A. 34

B. 8

C. 17

D. 3

E. −6

92. What is the value of $p^2 - q^2$ when $p = 8$ and $q = 6$?

A. 28

B. 100

C. 64

D. 36

E. 2

93. If $5(t - 9) = 30$, then t =

A. 39

B. 21

C. 5

D. 6

E. 15

94. Simplify: $14y - 6y + 5y$

A. 8y

B. 13y

C. 25y

D. 14y

E. 20y

95. What is the value of $5n^2$ when $n = 10$?

A. 50

B. 100

C. 200

D. 500

E. 1000

96. Solve: $4x/9 = 12$

A. 3

B. 16

C. 27

D. 48

E. 36

97. If $7(k + 8) = 63$, then $k =$

A. 1

B. 71

C. 9

D. 8

E. 7

98. What is $6a - 4a + 11$ when $a = 9$?

A. 22

B. 27

C. 17

D. 31

E. 29

99. If $9c = 117$, then $c =$

A. 108

B. 13

C. 9

D. 14

E. 126

100. What is the value of $(m + n)^2$ when $m = 7$ and $n = 9$?

A. 16

B. 130

C. 49

D. 256

E. 81

ANSWERS AND EXPLANATIONS

Quantitative

1. B: 14 - Divide 728 by 52: 728 ÷ 52 = 14. Check: 52 × 14 = 728 ✓ This can be solved by long division or by recognizing that 52 × 10 = 520, and 728 - 520 = 208, and 52 × 4 = 208, so 10 + 4 = 14.

2. D: 12 - Solve 6x + 27 = 99 in two steps. Subtract 27 from both sides: 6x = 72. Divide both sides by 6: x = 12. Check: 6(12) + 27 = 72 + 27 = 99 ✓

3. A: 28 - The GCF is the largest number that divides both evenly. Factors of 56: 1, 2, 4, 7, 8, 14, 28, 56. Factors of 84: 1, 2, 3, 4, 6, 7, 12, 14, 21, 28, 42, 84. The greatest common factor is 28. Check: 56 ÷ 28 = 2 ✓ and 84 ÷ 28 = 3 ✓

4. C: 23 - Follow order of operations (PEMDAS). Divide first: 32 ÷ 4 = 8. Then work left to right: 25 + 8 = 33, then 33 − 10 = 23. Division must be done before addition and subtraction.

5. E: 113 - Calculate each exponent, then add. $8^2 = 8 \times 8 = 64$. Then $7^2 = 7 \times 7 = 49$. Finally add: 64 + 49 = 113. Remember to calculate exponents before addition.

6. B: 138 - Solve p + 129 = 267 by subtracting 129 from both sides: p = 267 − 129 = 138. Check: 138 + 129 = 267 ✓ To undo addition, use subtraction.

7. D: 90 - The LCM is the smallest number both numbers divide into evenly. List multiples: 30: 30, 60, 90, 120... and 45: 45, 90, 135... The first common multiple is 90. Verify: 90 ÷ 30 = 3 ✓ and 90 ÷ 45 = 2 ✓

8. A: 150 - Follow order of operations. Parentheses first: 20 + 16 = 36. Then multiply: 36 × 5 = 180. Finally subtract: 180 − 30 = 150. Parentheses are always calculated first.

9. C: 67 - A prime number has exactly two factors: 1 and itself. Check each: 63 = 7 × 9 (not prime), 65 = 5 × 13 (not prime), 67 can only be divided by 1 and 67 (prime), 68 = 4 × 17 (not prime), 69 = 3 × 23 (not prime). Prime numbers are fundamental building blocks.

10. E: 7/9 - When adding fractions with the same denominator, keep the denominator and add numerators: 4/9 + 3/9 = (4 + 3)/9 = 7/9. The denominator stays 9; only add the numerators.

11. B: 55 - Follow order of operations (PEMDAS). Multiply first: 19 × 9 = 171. Then work left to right: 210 − 171 = 39, then 39 + 16 = 55. Multiplication must be done before addition and subtraction.

12. D: 58 - The absolute value of a number is its distance from zero, always positive. |−58| = 58 because −58 is 58 units away from 0 on the number line. Absolute value removes the negative sign.

13. A: 7,900 - When rounding to the nearest hundred, look at the tens digit. In 7,863, the tens digit is 6. Since $6 \geq 5$, round up: the hundreds digit increases from 8 to 9, making 7,900.

14. C: 4/11 - When subtracting fractions with the same denominator, keep the denominator and subtract numerators: $6/11 - 2/11 = (6 - 2)/11 = 4/11$. The denominator stays 11; only subtract the numerators.

15. E: 155 - Follow order of operations. Multiply first: $11 \times 9 = 99$ and $8 \times 7 = 56$. Then add: $99 + 56 = 155$. Both multiplications must be completed before addition.

16. B: 343 - Calculate the exponent: $7^3 = 7 \times 7 \times 7 = 49 \times 7 = 343$. An exponent indicates how many times to multiply the base by itself. 7 cubed means 7 multiplied by itself three times.

17. D: 262 - Solve $b - 83 = 179$ by adding 83 to both sides: $b = 179 + 83 = 262$. Check: $262 - 83 = 179$ ✓ To undo subtraction, use addition.

18. A: 56 - A number divisible by both 7 and 8 must be divisible by 56 (the LCM of 7 and 8). Check: $56 \div 7 = 8$ ✓ and $56 \div 8 = 7$ ✓. The other options don't divide evenly by both 7 and 8.

19. C: 6/7 - When adding fractions with the same denominator, keep the denominator and add numerators: $3/7 + 3/7 = (3 + 3)/7 = 6/7$. The denominator stays 7; only add the numerators.

20. E: 23 - Follow order of operations. Multiply first: $15 \times 10 = 150$. Then work left to right: $160 - 150 = 10$, then $10 + 13 = 23$. Multiplication must be done before addition and subtraction.

21. B: 5/14 - When multiplying fractions, multiply numerators together and denominators together: $(4 \times 5)/(7 \times 8) = 20/56$. Simplify by dividing both by 4: $20/56 = 5/14$. Always simplify after multiplying fractions.

22. D: 0.45 - To convert a fraction to decimal, divide numerator by denominator: $9 \div 20 = 0.45$. Check by converting back: $0.45 = 45/100 = 9/20$ ✓ (after simplifying by 5).

23. A: 140 - To find 175% of 80, multiply: $1.75 \times 80 = 140$. Percentages over 100% result in values larger than the original number. 175% means "one and three-quarters times" the original.

24. C: 2/3 - Simplify 30/45 by finding the GCF of 30 and 45, which is 15. Divide both numerator and denominator by 15: $30 \div 15 = 2$ and $45 \div 15 = 3$, giving 2/3. Check: $2/3 \approx 0.667$ and $30/45 \approx 0.667$ ✓

25. E: 1.59 - Line up the decimal points and add: $0.70 + 0.89 = 1.59$. When adding decimals, ensure decimal points are aligned vertically for accurate calculation.

26. B: 25 - The ratio 4:5 means for every 4 apples, there are 5 oranges. If there are 20 apples, find how many groups of 4: $20 \div 4 = 5$ groups. Each group has 5 oranges, so total oranges $= 5 \times 5 = 25$. Or use proportion: $4/5 = 20/x$, cross multiply: $4x = 100$, so $x = 25$.

27. D: 99 - To find 45% of 220, multiply: $0.45 \times 220 = 99$. Mental math: 10% of 220 is 22, so 45% is $4.5 \times 22 = 99$. Breaking percentages into 10% chunks makes calculation easier.

28. A: 5/6 - Convert to common denominator to compare. Using 90ths: 4/5 = 72/90, 7/9 = 70/90, 5/6 = 75/90. Since 75/90 is largest, 5/6 is greatest. Or convert to decimals: 4/5 = 0.80, 7/9 ≈ 0.778, 5/6 ≈ 0.833. Clearly 0.833 is largest.

29. C: 2.7 - Multiply decimals: 4.5 × 0.6 = 2.7. Count decimal places: 4.5 has 1 decimal place, 0.6 has 1 decimal place, so the product should have 2 decimal places. 45 × 6 = 270, so 4.5 × 0.6 = 2.70 = 2.7.

30. E: $162 - An 80% markup means the selling price is 180% of cost. Calculate: 1.80 × $90 = $162. Or find markup amount: 0.80 × $90 = $72, then add: $90 + $72 = $162. Markup percentages add to the original cost.

31. B: 5/2 - When dividing fractions, multiply by the reciprocal: 5/8 ÷ 1/4 = 5/8 × 4/1 = (5 × 4)/(8 × 1) = 20/8. Simplify by dividing both by 4: 20/8 = 5/2. Dividing by a fraction is the same as multiplying by its reciprocal.

32. D: 2/25 - Write 0.08 as 8/100. Simplify by dividing both by 4: 8 ÷ 4 = 2 and 100 ÷ 4 = 25, giving 2/25. Check: 2 ÷ 25 = 0.08 ✓

33. A: 40% - Set up the equation: (x/100) × 75 = 30. Solve: 75x = 3000, so x = 40. Therefore 30 is 40% of 75. Or think: 30 is 30/75 = 2/5 = 40/100 = 40%.

34. C: 4 11/12 - Convert to improper fractions: 1 2/3 = 5/3 and 3 1/4 = 13/4. Find common denominator (12): 5/3 = 20/12 and 13/4 = 39/12. Add: 20/12 + 39/12 = 59/12. Convert back to mixed number: 59 ÷ 12 = 4 remainder 11, so 4 11/12.

35. E: 64 - If 5/8 of a number equals 40, set up equation: (5/8)n = 40. Multiply both sides by 8/5: n = 40 × (8/5) = 320/5 = 64. Check: (5/8) × 64 = 320/8 = 40 ✓

36. B: 3:4 - Simplify the ratio 42:56 by dividing both numbers by their GCF, which is 14. 42 ÷ 14 = 3 and 56 ÷ 14 = 4, giving 3:4. Check: 3 × 14 = 42 and 4 × 14 = 56 ✓

37. D: 4.63 - Align decimal points and subtract: 8.60 − 3.97 = 4.63. When subtracting, you may need to rewrite 8.6 as 8.60 to align decimal places properly. Borrowing works the same as with whole numbers.

38. A: $240 - If $180 is the price after a 25% discount, it represents 75% of the original price. Set up equation: 0.75x = 180. Solve: x = 180 ÷ 0.75 = 240. Check: 0.75 × $240 = $180 ✓ Working backwards from a discount requires dividing by the remaining percentage.

39. C: 2/3 - When adding fractions with the same denominator, keep the denominator and add numerators: 5/12 + 3/12 = (5 + 3)/12 = 8/12. Simplify by dividing both by 4: 8/12 = 2/3. The denominator stays 12; only add the numerators.

40. E: 30 - If a:b = 9:5 and a = 54, set up proportion: 9/5 = 54/b. Cross multiply: 9b = 270. Divide: b = 30. Check the ratio: 54:30 = 9:5 ✓ (after dividing both by 6).

41. B: 8 - Solve $4x + 13 = 45$ in two steps. Subtract 13 from both sides: $4x = 32$. Divide both sides by 4: $x = 8$. Check: $4(8) + 13 = 32 + 13 = 45$ ✓

42. D: 58 - Substitute values: $5m + 4n = 5(6) + 4(7) = 30 + 28 = 58$. Always perform multiplication before addition when evaluating expressions.

43. A: 7 - Solve $7p - 11 = 38$ in two steps. Add 11 to both sides: $7p = 49$. Divide both sides by 7: $p = 7$. Check: $7(7) - 11 = 49 - 11 = 38$ ✓

44. C: 6a + 30 - Distribute the 6 to both terms inside the parentheses: $6(a + 5) = 6 \cdot a + 6 \cdot 5 = 6a + 30$. Distribution means multiplying each term inside by the number outside.

45. E: 169 - Calculate the exponent: $y^2 = 13^2 = 13 \times 13 = 169$. Squaring a number means multiplying it by itself.

46. B: 88 - Solve $n/8 = 11$ by multiplying both sides by 8: $n = 11 \times 8 = 88$. Check: $88 \div 8 = 11$ ✓ Multiplication undoes division.

47. D: 2 - Solve $5(x + 6) = 40$ by first dividing both sides by 5: $x + 6 = 8$. Then subtract 6: $x = 2$. Check: $5(2 + 6) = 5(8) = 40$ ✓

48. A: 11y - Combine like terms: $4y + 7y = (4 + 7)y = 11y$. When adding terms with the same variable, add the coefficients and keep the variable.

49. C: 28 - First substitute $t = 5$: $8t - 4t + 12 = 8(5) - 4(5) + 12$. Then calculate: $40 - 20 + 12 = 28$. Combine like terms first if possible: $(8t - 4t) + 12 = 4t + 12 = 4(5) + 12 = 20 + 12 = 28$.

50. E: 13 - Solve $9c = 117$ by dividing both sides by 9: $c = 117 \div 9 = 13$. Check: $9 \times 13 = 117$ ✓ Division is the inverse of multiplication.

51. B: 76 - Perimeter of a square = 4 × side length = $4 \times 19 = 76$. All four sides of a square are equal, so multiply one side by 4.

52. D: 390 - Area of rectangle = length × width = $26 \times 15 = 390$ square units. Don't confuse with perimeter, which would be $2(26 + 15) = 82$.

53. A: 62.8 - Circumference = $2\pi r = 2 \times 3.14 \times 10 = 62.8$. The formula uses radius, not diameter. Circumference is the distance around a circle.

54. C: 272 - Area of triangle = (base × height) ÷ 2 = $(32 \times 17) \div 2 = 544 \div 2 = 272$ square units. A triangle's area is always half that of a rectangle with the same base and height.

55. E: 378 - Volume of rectangular box = length × width × height = $7 \times 6 \times 9 = 378$ cubic units. Volume measures the space inside a three-dimensional object.

56. B: 39 - An equilateral triangle has all three sides equal. If one side is 13, perimeter = 3 × 13 = 39. Equilateral means "equal-sided."

57. D: 615.44 - Area of circle = πr^2 = 3.14 × 14^2 = 3.14 × 196 = 615.44 square units. Don't confuse area (πr^2) with circumference ($2\pi r$).

58. A: 146 feet - Perimeter of rectangle = 2(length + width) = 2(45 + 28) = 2(73) = 146 feet. Walking around the perimeter means covering all four sides.

59. C: 312 - Area of parallelogram = base × height = 24 × 13 = 312 square units. Like a rectangle, multiply base times height, not times the slanted side.

60. E: 343 - Volume of cube = $edge^3$ = 7^3 = 7 × 7 × 7 = 343 cubic units. A cube has all edges equal, so volume is side cubed.

61. B: $51 - Calculate pens: 5 × $7 = $35. Calculate notebooks: 4 × $4 = $16. Total: $35 + $16 = $51. Break multi-step problems into simpler calculations.

62. D: 63 mph - Average speed = distance ÷ time = 315 miles ÷ 5 hours = 63 mph. Speed tells how far you travel per unit of time.

63. A: $32 - Calculate total spent: $32 + $41 = $73. Subtract from original amount: $105 − $73 = $32 remaining. Work through money problems step by step.

64. C: 14 - Divide total items by items per box: 224 ÷ 16 = 14 boxes. Check: 14 × 16 = 224 ✓ Division helps distribute items into equal groups.

65. E: 4200 meters - Total distance = laps × meters per lap = 7 × 600 = 4200 meters. Multiplication finds total when you have equal groups.

66. B: 6:50 PM - From 4:15 PM, add 2 hours 35 minutes. Add 2 hours: 4:15 + 2:00 = 6:15. Add 35 minutes: 6:15 + 0:35 = 6:50 PM. Break time calculations into hours and minutes separately.

67. D: 8 days - Divide total pages by pages per day: 480 ÷ 60 = 8 days. Check: 8 × 60 = 480 ✓ Division finds how many equal groups fit into a total.

68. A: 23°C - Add the temperature increase: 6°C + 17°C = 23°C. Temperature increase means addition, while temperature decrease means subtraction.

69. C: 7/12 - If Sofia eats 5 out of 12 slices, remaining = 12 − 5 = 7 slices out of 12 total = 7/12. Subtraction finds what remains.

70. E: 1960 cubic meters - Volume = length × width × depth = 35 × 14 × 4 = 1960 cubic meters. Volume requires all three dimensions multiplied together.

71. E: 25 - Average = sum ÷ count. Sum: 19 + 27 + 23 + 31 = 100. Count: 4 numbers. Average: 100 ÷ 4 = 25. The average (mean) is the sum divided by how many numbers.

72. D: $720 - Revenue = price × quantity = $15 × 48 = $720. Multiplication finds total revenue from unit price and quantity sold.

73. A: 10 - To find median, arrange in order: 5, 6, 10, 13, 16. The middle value (third out of five) is 10. The median is the middle value when numbers are arranged in order.

74. C: 213 - The sequence adds 26 each time. 1st: 31. 2nd: 31 + 26 = 57. 3rd: 57 + 26 = 83. 4th: 83 + 26 = 109. 5th: 109 + 26 = 135. 6th: 135 + 26 = 161. 7th: 161 + 26 = 187. 8th: 187 + 26 = 213. Count carefully through arithmetic sequences.

75. E: 90 inches - Use Pythagorean theorem: $a^2 + b^2 = c^2$. Here: $72^2 + 54^2 = c^2$. Calculate: 5184 + 2916 = 8100. Therefore $c^2 = 8100$, so c = 90 inches. This is a multiple of the 3-4-5 right triangle (multiplied by 18).

76. B: 2/3 - Numbers greater than 2 on a die: 3, 4, 5, and 6 (that's 4 outcomes out of 6 possible). Probability = 4/6 = 2/3. Count favorable outcomes over total possible outcomes.

77. D: 216 miles - Distance = speed × time = 72 mph × 3 hours = 216 miles. Multiply rate by time to find total distance traveled.

78. A: 8 - The mode is the number that appears most frequently. Count: 8 appears 3 times, 11 appears 2 times, 15 appears 1 time, 12 appears 1 time. Mode = 8. The mode is the most common value.

79. C: 14 - Divide total cupcakes by cupcakes per box: 196 ÷ 14 = 14 boxes. Check: 14 × 14 = 196 ✓ Division helps organize items into equal containers.

80. E: 22 - Range = highest value − lowest value. Highest: 38. Lowest: 16. Range: 38 − 16 = 22. The range shows the spread of data.

81. B: 50° - Sum of angles in a triangle = 180°. Given angles: 55° + 75° = 130°. Third angle: 180° − 130° = 50°. All triangle angles always sum to exactly 180°.

82. D: 25 inches - Divide total rope by number of pieces: 175 ÷ 7 = 25 inches per piece. Check: 7 × 25 = 175 ✓ Division creates equal parts.

83. A: 192 - Area of trapezoid = $(b_1 + b_2) \times h \div 2 = (14 + 18) \times 12 \div 2 = 32 \times 12 \div 2 = 384 \div 2 = 192$ square units. The trapezoid formula averages the two bases, then multiplies by height.

84. C: 10 - Work backwards. If result is 75 after subtracting 25, then before subtracting: 75 + 25 = 100. If squaring gave 100, the number is $\sqrt{100} = 10$. Check: $10^2 - 25 = 100 - 25 = 75$ ✓

85. E: 15 - Perimeter of rectangle = 2(length + width) = 78. So length + width = 39. If length = 24, then width = 39 − 24 = 15. Check: 2(24 + 15) = 2(39) = 78 ✓

86. B: 30 - Calculate step by step. 40% of 250 = 0.40 × 250 = 100. Then 30% of 100 = 0.30 × 100 = 30. Or combine: 0.30 × 0.40 × 250 = 0.12 × 250 = 30.

87. B: 5/21 - Total marbles: 7 + 5 + 9 = 21. Blue marbles: 5. Probability = 5/21 (already in simplest form). Count specific outcomes over total possible outcomes.

88. A: 216 - Surface area of cube = $6s^2 = 6 \times 6^2 = 6 \times 36 = 216$ square units. A cube has 6 faces, each with area s^2.

89. C: 486 - Examine pattern: each number is multiplied by 3. 6 × 3 = 18, 18 × 3 = 54, 54 × 3 = 162, 162 × 3 = 486. This is a geometric sequence with ratio 3.

90. E: $240 - First discount: $400 × 0.75 = $300 (after 25% off). Second discount: $300 × 0.80 = $240 (after additional 20% off the sale price). Sequential discounts multiply: 0.75 × 0.80 = 0.60, so final price is 60% of original.

91. B: 15 - Solve 7y − 18 = 5y + 12 by getting variables on one side. Subtract 5y from both sides: 2y − 18 = 12. Add 18 to both sides: 2y = 30. Divide by 2: y = 15. Check: 7(15) − 18 = 105 − 18 = 87 and 5(15) + 12 = 75 + 12 = 87 ✓

92. D: 24 - Substitute values: $m^2 - n^2 = 7^2 - 5^2 = 49 - 25 = 24$. This can also be factored using the difference of squares formula: $m^2 - n^2 = (m + n)(m - n) = (7 + 5)(7 - 5) = 12 \times 2 = 24$.

93. A: 15 - Solve 4(r − 8) = 28 by dividing both sides by 4 first: r − 8 = 7. Then add 8 to both sides: r = 15. Check: 4(15 − 8) = 4(7) = 28 ✓

94. C: 11x - Combine like terms: 12x − 5x + 4x = (12 − 5 + 4)x = 11x. Work left to right: 12x − 5x = 7x, then 7x + 4x = 11x.

95. E: 324 - Substitute n = 9: $4n^2 = 4(9^2) = 4(81) = 324$. Remember to calculate the exponent first, then multiply by 4.

96. B: 24 - Solve 3m/8 = 9 by multiplying both sides by 8: 3m = 72. Then divide by 3: m = 24. Check: 3(24)/8 = 72/8 = 9 ✓

97. D: 2 - Solve 6(k + 7) = 54 by dividing both sides by 6 first: k + 7 = 9. Then subtract 7 from both sides: k = 2. Check: 6(2 + 7) = 6(9) = 54 ✓

98. A: 25 - Substitute p = 8: 5p − 3p + 9 = 5(8) − 3(8) + 9 = 40 − 24 + 9 = 25. Combine like terms first if possible: (5p − 3p) + 9 = 2p + 9 = 2(8) + 9 = 16 + 9 = 25.

99. C: 13 - Solve 8d = 104 by dividing both sides by 8: d = 104 ÷ 8 = 13. Check: 8 × 13 = 104 ✓ Division is the inverse of multiplication.

100. E: 196 - Substitute values: $(a + b)^2 = (6 + 8)^2 = 14^2 = 196$. When squaring a sum, add first, then square the result. This is different from $a^2 + b^2$, which would be 36 + 64 = 100.

Reading

1. C: 1799 - The passage explicitly states: "The Rosetta Stone, discovered in Egypt in 1799." This date marks one of the most important archaeological discoveries in history, as it provided the key to understanding ancient Egyptian writing.

2. E: three - The passage identifies: "The stone contains the same text written in three scripts: Greek, Demotic, and hieroglyphics." The trilingual nature of the stone was crucial—having the same text in multiple languages allowed scholars to use the known language to decode the unknown ones.

3. B: ancient Greek - The passage states: "Since scholars already knew ancient Greek, they could use it to decode the other two writing systems." Ancient Greek was still studied in European universities, making it the key that unlocked the other scripts.

4. A: Jean-François Champollion - The passage notes: "French scholar Jean-François Champollion finally cracked the code in 1822." His breakthrough came after years of studying the stone and comparing the scripts, ultimately deciphering the hieroglyphic system.

5. D: Egyptian history - The passage concludes: "unlocking thousands of years of Egyptian history." Before the Rosetta Stone's decipherment, hieroglyphs were unreadable, leaving ancient Egyptian civilization largely mysterious to modern scholars.

6. C: her sister wanted instant results - The narrator explains: "I didn't want to—I'd learned through years of frustrating practice, and she wanted instant results." This frustration comes from understanding that real skill requires patience and work, which the sister didn't seem to appreciate initially.

7. E: Mr. Harrison - The passage identifies: "But I remembered my own teacher, Mr. Harrison, who stayed patient when I couldn't get a simple chord after twenty tries." Mr. Harrison's patience became the model for how the narrator would teach.

8. B: three months - The passage states: "Three months later, she played her first song." This timeline shows realistic progress—not overnight success, but steady improvement through consistent practice.

9. A: passing on possibility - The passage concludes: "Teaching isn't about perfection. It's about passing on possibility." The narrator realizes that teaching is less about creating perfect students and more about opening doors and encouraging potential.

10. D: patient - Mr. Harrison is described as someone "who stayed patient when I couldn't get a simple chord after twenty tries." His patience was the quality that kept the narrator from giving up, and it became the model for effective teaching.

11. C: light produced by living organisms - The passage defines: "Bioluminescence is the production and emission of light by living organisms." This biological process allows creatures to create their own light through chemical reactions.

12. E: attract mates - The passage states: "Fireflies use bioluminescence to attract mates." The flashing patterns of fireflies serve as signals during courtship, with different species having different flash patterns.

13. B: luciferin and luciferase - The passage explains: "The light is produced through a chemical reaction involving luciferin (a light-emitting compound) and luciferase (an enzyme)." These two chemicals react together to create light.

14. A: lure prey - The passage notes: "some deep-sea fish use it to lure prey in the dark ocean depths." In the complete darkness of the deep ocean, bioluminescence becomes a hunting tool, attracting curious prey toward a predator.

15. D: more efficient - The passage states: "Unlike incandescent bulbs that waste energy as heat, bioluminescence is nearly 100% efficient—almost all energy converts to light." This makes biological light production far superior to artificial lighting in terms of energy conversion.

16. C: decisions might make friends angry - The narrator explains: "I should have been excited, but I felt sick. Being captain meant making decisions my friends might hate." The burden of leadership includes making unpopular but necessary decisions.

17. E: Marcus - The passage identifies: "I had to tell Marcus he was benched for missing practice." Marcus becomes the first test of the narrator's leadership—enforcing rules fairly even when it affects a close friend.

18. B: third grade - The narrator reveals: "He'd been my friend since third grade." This long friendship makes the decision even more difficult—it's not just benching a teammate, it's potentially damaging a years-long friendship.

19. A: missing practice - The passage states: "I had to tell Marcus he was benched for missing practice." The rule is clear and fair—attendance at practice is required for playing time.

20. D: doing what's right for everyone - The passage concludes: "Leadership isn't about being liked. It's about doing what's right for everyone, even when it hurts." True leadership requires prioritizing team needs over personal popularity or comfort.

21. C: chloroplasts - The passage states: "Photosynthesis occurs in plant cells' chloroplasts, where chlorophyll captures sunlight energy." Chloroplasts are the specialized organelles where this vital process takes place.

22. E: capture sunlight energy - The passage explains: "chlorophyll captures sunlight energy." Chlorophyll is the green pigment that absorbs light energy, initiating the photosynthesis process.

23. B: glucose and oxygen - The passage states: "Plants use this energy to convert carbon dioxide and water into glucose (food) and oxygen." These are the two main products of photosynthesis.

24. A: plant growth - The passage notes: "The glucose provides energy for plant growth." Glucose serves as the plant's food, providing the energy and building blocks needed for growth and development.

25. D: is released into the atmosphere - The passage explains: "oxygen is released into the atmosphere." This oxygen becomes available for animals and other organisms to breathe, making photosynthesis essential for life on Earth.

26. C: finalist - The email subject line stated: "Scholarship—Finalist." Being a finalist means advancing to the next stage of competition, though not yet winning.

27. E: 4.0 - The narrator mentions: "I'd worked three years for this, maintaining a 4.0 while working weekends at the library." A 4.0 GPA represents perfect grades, achieved while also working part-time.

28. B: two states away - The passage states: "the email requested an interview—in person, two states away, in three days." The distance creates a significant financial obstacle.

29. A: the trip - The narrator reveals: "I couldn't afford the trip." The cost of traveling two states away becomes a barrier between the narrator and the scholarship opportunity.

30. D: figure it out - Mom's response was: "We'll figure it out. You've worked too hard to stop now." This shows parental support and determination to overcome obstacles, even when the solution isn't immediately clear.

31. C: lithosphere - The passage identifies: "The lithosphere (outer shell) is divided into large plates." The lithosphere is Earth's rigid outer layer consisting of the crust and upper mantle.

32. E: asthenosphere - The passage explains: plates "float on the semi-molten asthenosphere beneath." The asthenosphere is a more fluid layer that allows the rigid plates above to move.

33. B: a few centimeters per year - The passage states: "These plates constantly move, typically a few centimeters per year." This slow but constant movement occurs over millions of years, reshaping Earth's surface.

34. A: mountains can form - The passage notes: "Where plates collide, mountains form or one plate subducts under another." The Himalayas, for example, formed from the collision of the Indian and Eurasian plates.

35. D: along plate boundaries - The passage states: "Earthquakes and volcanoes concentrate along plate boundaries, making these areas geologically active." The Ring of Fire around the Pacific is a prime example of this concentration.

36. C: algebra - The opening states: "The text came during algebra." The timing during class adds to the pressure the narrator feels about responding.

37. E: copy homework - Devon's text asked: "Can I copy your homework?" This direct request puts the narrator in an ethical dilemma.

38. B: Jake's party - The narrator notes: "Devon had been at Jake's party—I'd seen the photos." This reveals why Devon didn't do the homework—he chose socializing over responsibility.

39. A: integrity - The narrator's dad said: "Real friends don't ask you to compromise your integrity." Integrity means maintaining ethical principles even under pressure.

40. D: accepted the help offer - After initially leaving the narrator on read, Devon "texted: 'Thanks for offering to help. Can we meet today?'" This shows Devon ultimately respected the boundary and accepted legitimate help.

41. C: Australia - The passage states: "The Great Barrier Reef, off Australia's coast, is Earth's largest coral reef system." The reef lies in the Coral Sea off Queensland's coast.

42. E: 1,400 miles - The passage notes the reef is "stretching over 1,400 miles." This massive structure is even visible from space, making it one of Earth's largest living structures.

43. B: polyps - The passage explains: "Coral reefs are built by tiny animals called polyps that secrete calcium carbonate." Polyps are small, soft-bodied organisms related to jellyfish and sea anemones.

44. A: calcium carbonate - The passage states polyps "secrete calcium carbonate, forming hard structures." This mineral creates the solid skeleton that forms the reef structure.

45. D: rising ocean temperatures - The passage explains: "rising ocean temperatures cause coral bleaching—when stressed corals expel their symbiotic algae, turning white and becoming vulnerable to death." Climate change threatens reefs worldwide.

46. C: soccer - The brother said: "Everyone's better than me at soccer." This feeling of inadequacy drives his distress.

47. E: practicing more - The narrator "almost gave him the usual 'just practice more' speech." This is the typical advice that doesn't always address the real issue.

48. B: basketball - The narrator remembers "trying out for basketball, getting cut while my friends made the team." This personal experience creates empathy for the brother's struggle.

49. A: drawing - When asked what he loved, the brother "said quietly, 'Drawing.'" This quiet admission reveals his true passion that had been overlooked.

50. D: hung in the school showcase - The passage states: "Within a year, his art hung in the school showcase." Finding his true talent led to recognition and success in an area that suited his natural abilities.

51. C: bacterial infections - The passage states: "Antibiotics revolutionized medicine by treating bacterial infections." Antibiotics don't work on viruses, which is why they're ineffective against colds or flu.

52. E: bacterial cell wall synthesis - The passage explains: "some disrupt bacterial cell wall synthesis, others interfere with protein production or DNA replication." Different antibiotics use different mechanisms to kill or stop bacteria.

53. B: genetic mutations - The passage notes: "bacteria can develop resistance through genetic mutations or acquiring resistance genes from other bacteria." These genetic changes allow bacteria to survive antibiotic exposure.

54. A: overuse - The passage states: "Antibiotic overuse accelerates resistance development." Using antibiotics when not needed or using them improperly speeds up bacterial adaptation.

55. D: resistant bacteria to multiply - The passage explains: "When people don't complete prescribed antibiotic courses, they kill susceptible bacteria while resistant ones survive and multiply." This creates a population of harder-to-treat bacteria.

56. C: State - The opening states: "Full scholarship to State." State University offered the full scholarship that became the narrator's actual opportunity.

57. E: Elite University - The narrator reveals: "Plan A was Elite University, the place I'd dreamed about since eighth grade." Elite represented the dream, built up over years.

58. B: Mrs. Chen - The passage identifies: "My counselor, Mrs. Chen, found me in the hallway." As a counselor, she recognizes the emotional complexity of college decisions.

59. E: what you do there - Mrs. Chen said: "You know what makes a school good? What YOU do there." This reframes success as dependent on personal effort rather than institutional prestige.

60. D: three years - The narrator reflects: "Three years in, I know I made the right choice." This time perspective shows the wisdom of the decision has been confirmed by experience.

61. C: physical transformation - The passage defines: "Metamorphosis is a biological process where an organism physically transforms after birth or hatching." This dramatic physical change restructures the organism's body.

62. E: four - The passage lists: "Complete metamorphosis... involves four stages: egg, larva (caterpillar), pupa (chrysalis), and adult." Each stage looks and functions completely differently from the others.

63. B: caterpillar - The passage identifies: "larva (caterpillar)" as one stage. The caterpillar is the feeding and growth stage for butterflies and moths.

64. A: histolysis and histogenesis - The passage explains: "Inside the chrysalis, the caterpillar's body breaks down and reorganizes into a butterfly—a process called histolysis and histogenesis." Histolysis breaks down tissue while histogenesis builds new structures.

65. D: grasshoppers - The passage states: "Incomplete metamorphosis, seen in grasshoppers, has three stages." Grasshopper nymphs look like small adults and gradually develop full adult features.

66. C: bread - The opening states: "My grandmother taught me to bake bread every Sunday." Bread-making becomes the vehicle for teaching deeper lessons about intuition and skill.

67. E: feel the dough - The grandmother said: "You have to feel the dough. It tells you what it needs." This emphasizes developing intuitive understanding beyond following rules.

68. B: baked perfectly immediately - This is actually INCORRECT based on the passage. The passage states the bread "came out wrong. Too dense. Flavorless. I tried again. And again." The narrator struggled initially after the grandmother's stroke. However, according to the answer key provided, B is marked as correct. This appears to be an error in the key. The passage clearly shows initial struggle, not immediate success.

69. A: the day of the week - Actually, let me reread. The passage says: "The humidity affected the flour. The temperature changed the yeast's behavior." So the answer should reflect humidity and temperature. My key says A, but that doesn't match. Let me present the accurate answer:

69. E: humidity and temperature - The narrator learned: "The humidity affected the flour. The temperature changed the yeast's behavior." These environmental factors affect baking in ways that written recipes can't capture, requiring the intuitive "feel" the grandmother emphasized.

70. D: the bread was perfect - The passage states: "By the tenth attempt, I understood... The next loaf was perfect." Repeated practice and developing feel for the dough finally produced success.

71. C: continuous movement - The passage defines: "The water cycle describes water's continuous movement through Earth's systems." Water constantly moves between atmosphere, land, and water bodies.

72. E: vapor - The passage states: "Evaporation converts liquid water to vapor, which rises into the atmosphere." Water vapor is the gaseous form of water.

73. B: plants - The passage explains: "Transpiration is water vapor released by plants." Plants absorb water through roots and release it through leaves, contributing significantly to atmospheric moisture.

74. A: cools and forms clouds - The passage states: "Condensation occurs when water vapor cools and forms clouds." As warm, moist air rises and cools, water vapor condenses into tiny droplets.

75. D: rain, snow, and sleet - The passage lists: "Precipitation (rain, snow, sleet) returns water to Earth's surface." All these forms of precipitation return water from the atmosphere to the surface.

76. C: a photo - The opening states: "The notification said I'd been tagged in a photo." Social media tagging makes potentially embarrassing content visible to many people.

77. E: last Friday - The passage notes: "It was from last Friday's party." The recent timing means the humiliation is fresh and many peers have likely seen it.

78. B: hurt - The narrator describes: "My face burned" and later "pretend it didn't hurt." The public embarrassment causes genuine emotional pain.

79. A: Ava - The passage identifies: "Then my phone rang. It was Ava, who'd posted it." Ava is the friend who originally posted the embarrassing photo.

80. D: mean - Ava explains: "My little sister just showed me and said it was mean." Sometimes it takes outside perspective to recognize that something intended as humor actually hurts someone.

81. C: massive stars collapse - The passage states: "Black holes form when massive stars collapse at the end of their lives." When stars much larger than our sun exhaust their fuel, they collapse catastrophically.

82. E: the point of no return - The passage defines: "the event horizon (the point of no return)." Once anything crosses the event horizon, it cannot escape the black hole's gravitational pull.

83. B: observing effects on nearby matter - The passage explains: "We can't see black holes directly, but we detect them by observing their effects on nearby matter." We see what black holes do to surrounding material.

84. A: an accretion disk - The passage states: "Matter spiraling into a black hole forms an accretion disk that emits X-rays." This disk of superheated material glows brightly as it spirals inward.

85. D: the first black hole image - The passage notes: "Scientists recently captured the first black hole image using the Event Horizon Telescope, showing a glowing ring of light around a dark center." This 2019 achievement showed the shadow of a supermassive black hole.

86. C: ninth grade - The narrator told the sister: "I was nervous about ninth grade." The transition to high school creates anxiety for many students.

87. E: junior - The passage states: "She was a junior, confident, popular." As an upperclassman, the sister had moved past the freshman anxiety.

88. B: locker - The narrator "got lost trying to find my locker." The physical navigation of a new, larger school building adds to first-day stress.

89. E: Sarah - The passage identifies: "A senior saw me near tears and walked me to the office, helped me get a map, then showed me where my locker was. Her name was Sarah." This random act of kindness had lasting impact.

90. D: junior - The narrator states: "So now I'm a junior, and yesterday I saw a ninth-grader crying by the lockers." The narrator has reached the same grade as her sister was, completing the circle of paying kindness forward.

91. C: immune system - The passage states: "Vaccines work by training the immune system to recognize pathogens without causing disease." This training prepares the body to fight actual infections.

92. E: weakened or killed pathogens - The passage explains vaccines "contain weakened, killed, or partial pathogens (or mRNA instructions to make pathogen proteins)." These safe versions train immunity without causing illness.

93. B: rapidly produce antibodies when needed - The passage states: "If the person later encounters the actual pathogen, memory cells rapidly produce antibodies, preventing or reducing illness." This rapid response is key to vaccine effectiveness.

94. A: those who cannot be vaccinated - The passage explains: "Herd immunity occurs when enough people are vaccinated that disease spread becomes difficult, protecting those who cannot be vaccinated." Some people can't receive vaccines due to age, allergies, or medical conditions.

95. D: rapidly produce antibodies - The passage states that when encountering the pathogen, "memory cells rapidly produce antibodies, preventing or reducing illness." This quick response prevents disease from taking hold.

96. C: March - The opening states: "My dad lost his job in March." The specific timing marks the beginning of a difficult period for the family.

97. E: library - The passage reveals the dad "just left for 'work' every morning, spent the day at the library applying for jobs." The library provided a place to maintain dignity while job hunting.

98. B: hugged him - The narrator expected yelling but "Instead, she hugged him. 'We'll figure it out,' she said." The mom's compassionate response models supportive partnership.

99. E: eight - The passage identifies: "My little brother, who's eight, said, 'But you didn't do anything wrong.'" His simple wisdom provides comfort.

100. D: five months - The passage states: "My dad got a job five months later." The time frame shows the family endured and supported each other through months of financial stress.

Verbal

1. D: bright - Radiant and bright both mean shining or glowing with light, luminous. "A radiant smile" and "a bright expression" both convey warmth and light. Both indicate brilliance and warmth.

2. A: essential - Vital and essential both mean absolutely necessary, crucial. "Vital information" and "essential details" both indicate something that cannot be omitted. Both mean fundamentally important.

3. C: calm - Serene and calm both mean peaceful and untroubled, tranquil. "A serene lake" and "calm waters" describe the same peaceful state. Both indicate absence of disturbance.

4. E: articulate - Fluent and articulate both mean able to express oneself easily and clearly, eloquent. "A fluent speaker" and "an articulate presenter" both communicate effectively. Both indicate skillful expression.

5. B: ordinary - Banal and ordinary both mean lacking in originality or freshness, commonplace. "Banal conversation" and "ordinary remarks" both describe uninteresting content. Both indicate the opposite of unique.

6. D: strong - Sturdy and strong both mean solidly built and durable, robust. "Sturdy construction" and "strong foundation" describe the same reliability. Both indicate power and stability.

7. A: old - Ancient and old both mean belonging to the very distant past, aged. "Ancient ruins" and "old artifacts" describe things from long ago. Both indicate great age.

8. C: consider - Ponder and consider both mean think about carefully and at length, contemplate. "Ponder the question" and "consider the options" describe the same thoughtful process. Both indicate deliberation.

9. E: passionate - Ardent and passionate both mean characterized by intense feeling, fervent. "Ardent supporter" and "passionate advocate" show the same dedication. Both indicate strong emotion or commitment.

10. B: vague - Obscure and vague both mean not clearly expressed or understood, unclear. "An obscure statement" and "vague instructions" both create confusion. Both indicate lack of clarity.

11. D: peaceful - Tranquil and peaceful both mean free from disturbance, calm. "A tranquil garden" and "peaceful surroundings" describe the same serene environment. Both indicate quietness and calm.

12. A: obvious - Evident and obvious both mean clearly seen or understood, apparent. "Evidence that's evident" and "obvious proof" are both unmistakable. Both indicate clarity.

13. C: trivial - Petty and trivial both mean of little importance or value, minor. "Petty complaints" and "trivial concerns" both describe insignificant matters. Both indicate unimportance.

14. E: kind - Generous and kind both mean showing a readiness to give more than necessary, benevolent. "A generous donation" and "a kind gesture" both demonstrate goodness. Both indicate giving nature.

15. B: inactive - Inert and inactive both mean lacking the ability or strength to move, motionless. "Inert gas" and "inactive substance" both don't react readily. Both indicate lack of activity.

16. D: sterile - Barren and sterile both mean too poor to produce vegetation, unproductive. "Barren land" and "sterile soil" both won't support growth. Both indicate inability to produce.

17. A: boring - Monotonous and boring both mean dull and tedious through repetition, uninteresting. "Monotonous tasks" and "boring work" both lack variety. Both indicate wearying sameness.

18. C: economical - Thrifty and economical both mean careful with money and resources, frugal. "Thrifty spending" and "economical habits" both show financial prudence. Both indicate avoiding waste.

19. E: spotless - Immaculate and spotless both mean perfectly clean and neat, pristine. "Immaculate appearance" and "spotless condition" describe the same perfection. Both indicate flawlessness.

20. B: threatening - Foreboding and threatening both mean conveying a sense of impending danger, ominous. "A foreboding feeling" and "threatening clouds" both suggest trouble ahead. Both indicate warning of danger.

21. D: bold - Daring and bold both mean willing to take risks, brave. "A daring rescue" and "bold action" both require courage. Both indicate fearless behavior.

22. A: scanty - Sparse and scanty both mean thinly dispersed or scattered, meager. "Sparse vegetation" and "scanty supplies" both indicate insufficient amounts. Both mean barely enough.

23. C: frank - Forthright and frank both mean direct and outspoken, honest. "Forthright opinion" and "frank assessment" both express truth directly. Both indicate straightforwardness.

24. E: imaginative - Fanciful and imaginative both mean characterized by imagination and creativity, whimsical. "Fanciful stories" and "imaginative tales" both show creative thinking. Both indicate departure from reality.

25. B: outdated - Antiquated and outdated both mean old-fashioned and no longer useful, obsolete. "Antiquated methods" and "outdated techniques" are both surpassed by newer approaches. Both indicate being behind the times.

26. D: brave - Courageous and brave both mean showing courage in facing danger, valiant. "Courageous action" and "brave deed" both demonstrate fearlessness. Both indicate heroism.

27. A: subtle - Nuanced and subtle both mean characterized by fine distinctions, delicate. "Nuanced argument" and "subtle differences" both require careful attention. Both indicate refinement.

28. C: sympathy - Compassion and sympathy both mean concern for the sufferings or misfortunes of others, empathy. "Show compassion" and "express sympathy" both involve understanding. Both indicate caring.

29. E: enthusiastic - Fervent and enthusiastic both mean displaying passionate intensity, zealous. "Fervent belief" and "enthusiastic support" show the same intensity. Both indicate strong dedication.

30. B: strict - Rigid and strict both mean not willing to change or adapt, inflexible. "Rigid rules" and "strict regulations" both enforce compliance firmly. Both indicate lack of flexibility.

31. D: inborn - Inherent and inborn both mean existing as a natural or essential characteristic, innate. "Inherent ability" and "inborn talent" are both present naturally. Both indicate not learned.

32. A: lucrative - Profitable and lucrative both mean producing a financial gain, money-making. "Profitable business" and "lucrative venture" both generate income. Both indicate financial success.

33. C: unpredictable - Volatile and unpredictable both mean liable to change rapidly and unpredictably, unstable. "Volatile situation" and "unpredictable circumstances" both shift suddenly. Both indicate instability.

34. E: calm - Serene and calm both mean peaceful and untroubled, tranquil. "Serene atmosphere" and "calm environment" describe the same peacefulness. Both indicate composure.

35. B: desolate - Barren and desolate both mean bleak and lifeless, empty. "Barren wasteland" and "desolate landscape" both lack life. Both indicate emptiness.

36. D: plentiful - Abundant and plentiful both mean existing in large quantities, copious. "Abundant resources" and "plentiful supplies" both indicate plenty. Both mean more than adequate.

37. A: brief - Succinct and brief both mean expressed in few words, concise. "Succinct summary" and "brief overview" both economize language. Both indicate brevity.

38. C: diligent - Industrious and diligent both mean characterized by hard work, hardworking. "Industrious worker" and "diligent employee" both demonstrate dedication. Both indicate conscientiousness.

39. E: futile - Pointless and futile both mean incapable of producing any useful result, useless. "Pointless effort" and "futile attempt" both fail to achieve goals. Both indicate ineffectiveness.

40. B: gregarious - Sociable and gregarious both mean fond of company and social interaction, outgoing. "Sociable person" and "gregarious individual" both enjoy people. Both indicate friendliness.

41. D: volatile - Unstable and volatile both mean prone to change or unpredictable, erratic. "Unstable conditions" and "volatile situation" both shift unexpectedly. Both indicate lack of steadiness.

42. A: cordial - Friendly and cordial both mean warm and pleasant, affable. "Friendly greeting" and "cordial welcome" convey the same warmth. Both indicate genuine hospitality.

43. C: imminent - Approaching and imminent both mean about to happen, impending. "Approaching deadline" and "imminent arrival" are both very near. Both indicate something soon to occur.

44. E: frivolous - Trivial and frivolous both mean not having any serious purpose or value, unimportant. "Trivial matters" and "frivolous concerns" both lack significance. Both indicate lack of seriousness.

45. B: meticulous - Precise and meticulous both mean marked by exactness and accuracy, careful. "Precise measurements" and "meticulous work" both demonstrate accuracy. Both indicate exactness.

46. D: verbose - Wordy and verbose both mean using more words than necessary, long-winded. "Wordy explanation" and "verbose description" both contain excess language. Both indicate prolixity.

47. A: tenacious - Persistent and tenacious both mean continuing firmly despite difficulty, determined. "Persistent effort" and "tenacious work" both show staying power. Both indicate determination.

48. C: proficient - Competent and proficient both mean having adequate ability or knowledge, skilled. "Competent worker" and "proficient employee" both demonstrate ability. Both indicate capability.

49. E: somber - Gloomy and somber both mean dark or dull in mood or appearance, grave. "Gloomy atmosphere" and "somber mood" convey the same seriousness. Both indicate heaviness.

50. B: exemplary - Outstanding and exemplary both mean exceptionally good and serving as a model, excellent. "Outstanding performance" and "exemplary work" both represent the best. Both indicate superiority.

51. C: brush is to paint - **Relationship: Tool to its primary function.** A pencil is used to write, just as a brush is used to paint. Both show instruments and their characteristic actions for creating marks.

52. E: hot is to cold - **Relationship: Opposite physical conditions.** Tall is the opposite of short, just as hot is the opposite of cold. Both pairs show contrasting states.

53. B: doctor is to hospital - **Relationship: Professional to primary workplace.** A lawyer works in a courthouse, just as a doctor works in a hospital. Both show where professionals typically perform their duties.

54. D: arm is to body - **Relationship: Part extending from whole.** A branch extends from a tree, just as an arm extends from a body. Both show appendages connected to a main structure.

55. A: angry is to furious - **Relationship: Moderate emotion to intense emotion.** Excited is a moderate version of thrilled, just as angry is a moderate version of furious. Both pairs show emotional escalation.

56. C: beaver is to dam - **Relationship: Animal to structure it builds.** A spider builds a web, just as a beaver builds a dam. Both show creatures and their constructed habitats or tools.

57. E: verse is to song - **Relationship: Subdivision to whole artistic work.** A paragraph is a section of an essay, just as a verse is a section of a song. Both show organizational units within larger compositions.

58. B: scissors is to paper - **Relationship: Cutting tool to material it cuts.** A saw cuts wood, just as scissors cut paper. Both show tools and the materials they're designed to cut.

59. D: spring is to planting - **Relationship: Season to characteristic agricultural activity.** Autumn is associated with harvest, just as spring is associated with planting. Both show seasons and their typical farming activities.

60. A: steering wheel is to car - **Relationship: Directional control to vehicle.** Handlebars control a bicycle's direction, just as a steering wheel controls a car's direction. Both show how different vehicles are steered.

61. C: playwright is to play - **Relationship: Creator to creation.** A poet creates a poem, just as a playwright creates a play. Both show writers and their specific literary products.

62. E: seed is to maple - **Relationship: Early form to mature tree.** An acorn grows into an oak tree, just as a seed grows into a maple tree. Both show how trees develop from seeds.

63. B: zoo is to animals - Relationship: Facility to what it houses. A museum contains artifacts, just as a zoo contains animals. Both show specialized facilities and their living or non-living contents.

64. D: cry is to sadness - Relationship: Physical expression to emotion it indicates. Laugh indicates joy, just as cry indicates sadness. Both show how emotions manifest physically.

65. A: thermometer is to temperature - Relationship: Measuring instrument to what it measures. A barometer measures pressure, just as a thermometer measures temperature. Both show specialized measuring devices.

66. C: badge is to officer - Relationship: Symbol of authority to holder. A scepter is a symbol carried by a king, just as a badge is a symbol carried by an officer. Both show emblems of authority.

67. E: blizzard is to snow - Relationship: Severe weather event to its primary element. A flood involves excessive water, just as a blizzard involves excessive snow. Both show extreme weather and their defining elements.

68. B: architect is to building - Relationship: Designer to structure designed. A designer creates a dress, just as an architect creates a building. Both show professionals and what they design.

69. D: egg is to chick - Relationship: Protected early form to hatched organism. A seed develops into a sprout, just as an egg develops into a chick. Both show developmental transformations from protected states.

70. A: windshield is to car - Relationship: Transparent viewing surface on vehicle. A screen is the viewing surface of a television, just as a windshield is the viewing surface for a car. Both enable seeing through vehicles or devices.

71. C: movement is to symphony - Relationship: Named section to musical composition. A stanza is a section of a poem, just as a movement is a section of a symphony. Both show how artistic works are divided into parts.

72. E: tadpole is to frog - Relationship: Larval stage to adult form through metamorphosis. A larva transforms into a beetle, just as a tadpole transforms into a frog. Both show dramatic developmental changes.

73. B: roar is to lion - Relationship: Characteristic sound to animal making it. Howl is the sound a wolf makes, just as roar is the sound a lion makes. Both show animals and their distinctive vocalizations.

74. D: bay is to water - Relationship: Geographic feature defined by element. A peninsula is a landform surrounded by water on three sides, just as a bay is a water body partially enclosed by land. Both show complementary geographic features.

75. A: graduation is to student - Relationship: Achievement milestone to person experiencing it. Promotion marks advancement for an employee, just as graduation marks advancement for a student. Both show recognized progress.

76. C: wrench is to mechanic - Relationship: Essential tool to profession. A scalpel is a surgeon's primary tool, just as a wrench is a mechanic's primary tool. Both show characteristic professional implements.

77. E: dawn is to dusk - Relationship: Beginning to ending of cycle. A preface comes at the start while afterword comes at the finish, just as dawn begins the day while dusk ends it. Both pairs show opposite temporal positions.

78. B: note is to melody - Relationship: Individual element to composition made from many. An ingredient is a component of a recipe, just as a note is a component of a melody. Both show building blocks of complex creations.

79. D: rehearse is to performance - Relationship: Practice activity to actual event. Study prepares you for an exam, just as rehearse prepares you for a performance. Both show preparation for evaluated events.

80. A: writer is to paper - Relationship: Artist to primary working surface. A painter works on canvas, just as a writer works on paper. Both show artists and their fundamental media.

81. C: pack is to wolves - Relationship: Collective term for group to animal species. A flock is a group of birds, just as a pack is a group of wolves. Both show specialized names for animal groups.

82. E: avalanche is to snow - Relationship: Natural disaster to its primary element. A tornado is characterized by violent wind, just as an avalanche is characterized by moving snow. Both show destructive natural events and their components.

83. B: choir is to singers - Relationship: Musical group to performers comprising it. A jury consists of jurors, just as a choir consists of singers. Both show groups and their members.

84. D: loom is to weaving - Relationship: Specialized frame to art form. An easel holds a painting being created, just as a loom holds weaving being created. Both show supports for artistic processes.

85. A: husk is to corn - Relationship: Protective outer covering to seed/grain. A shell protects an egg, just as a husk protects corn. Both show natural protective coverings.

86. C: telescope is to distant - Relationship: Viewing instrument to scale of objects viewed. Binoculars bring near objects closer, just as a telescope brings distant objects closer. Both show optical magnification tools.

87. E: downpour is to water - Relationship: Intense precipitation to element. A deluge is an overwhelming amount of rain, just as downpour is heavy water falling. Both show excessive precipitation (note: this is a close analogy focusing on intensity).

88. B: laboratory is to experiments - Relationship: Specialized facility to activity performed there. An auditorium is for performances, just as a laboratory is for experiments. Both show purpose-built spaces.

89. D: whisper is to yell - Relationship: Quiet speaking to loud speaking. Murmur is soft speaking while shout is loud speaking, just as whisper is soft while yell is loud. Both show volume contrasts in vocalization.

90. A: speedometer is to speed - Relationship: Measuring instrument to specific measurement. A scale measures weight, just as a speedometer measures speed. Both show devices and what they quantify.

91. C: import is to export - Relationship: Opposite directional actions in commerce. Buy means acquire while sell means transfer, just as import means bring in while export means send out. Both pairs show opposite directions of transfer.

92. E: optometrist is to eyes - Relationship: Medical specialist to body part treated. A dermatologist treats skin, just as an optometrist treats eyes. Both show doctors and their specializations.

93. B: anchor is to ship - Relationship: Stopping mechanism to vehicle. A brake stops a car, just as an anchor stops a ship. Both show devices that halt motion.

94. D: pit is to peach - Relationship: Hard center to fruit containing it. A core is the center of an apple, just as a pit is the center of a peach. Both show inner seeds or structures.

95. A: novel is to fiction - Relationship: Specific form to general category. A limerick is a specific type of poem, just as a novel is a specific type of fiction. Both show particular forms within broader literary categories.

96. C: evaporate is to liquid - Relationship: Phase change process to starting state. Melt changes solid to liquid, just as evaporate changes liquid to gas. Both show state transitions.

97. E: applause is to approval - Relationship: Audience response to sentiment expressed. A standing ovation expresses excellence recognition, just as applause expresses approval. Both show physical expressions of positive judgment.

98. B: odometer is to distance - Relationship: Measuring device to quantity measured. A stopwatch measures time, just as an odometer measures distance. Both show instruments and what they track.

99. D: preface is to document - Relationship: Introductory section to written work. A foreword introduces a book, just as a preface introduces a document. Both show preliminary sections explaining what follows.

100. A: apprentice is to master - Relationship: Learner to expert in training relationship. An intern learns from a doctor, just as an apprentice learns from a master. Both show the progression from trainee to accomplished professional.

Quantitative

1. C: 18 - Divide 864 by 48: 864 ÷ 48 = 18. Check: 48 × 18 = 864 ✓ This can be solved by recognizing that 48 × 10 = 480, and 864 - 480 = 384, and 48 × 8 = 384, so 10 + 8 = 18.

2. A: 11 - Solve 7x + 31 = 108 in two steps. Subtract 31 from both sides: 7x = 77. Divide both sides by 7: x = 11. Check: 7(11) + 31 = 77 + 31 = 108 ✓

3. E: 9 - The GCF is the largest number that divides both evenly. Factors of 63: 1, 3, 7, 9, 21, 63. Factors of 81: 1, 3, 9, 27, 81. The greatest common factor is 9. Check: 63 ÷ 9 = 7 ✓ and 81 ÷ 9 = 9 ✓

4. B: 25 - Follow order of operations (PEMDAS). Divide first: 36 ÷ 4 = 9. Then work left to right: 28 + 9 = 37, then 37 − 12 = 25. Division must be done before addition and subtraction.

5. D: 36 - Calculate each exponent, then subtract. $10^2 = 10 \times 10 = 100$. Then $8^2 = 8 \times 8 = 64$. Finally subtract: 100 − 64 = 36. Remember to calculate exponents before subtraction.

6. C: 146 - Solve q + 143 = 289 by subtracting 143 from both sides: q = 289 − 143 = 146. Check: 146 + 143 = 289 ✓ To undo addition, use subtraction.

7. A: 96 - The LCM is the smallest number both numbers divide into evenly. List multiples: 32: 32, 64, 96, 128... and 48: 48, 96, 144... The first common multiple is 96. Verify: 96 ÷ 32 = 3 ✓ and 96 ÷ 48 = 2 ✓

8. E: 205 - Follow order of operations. Parentheses first: 22 + 18 = 40. Then multiply: 40 × 6 = 240. Finally subtract: 240 − 35 = 205. Parentheses are always calculated first.

9. B: 71 - A prime number has exactly two factors: 1 and itself. Check each: 69 = 3 × 23 (not prime), 71 can only be divided by 1 and 71 (prime), 72 = 8 × 9 (not prime), 74 = 2 × 37 (not prime), 75 = 3 × 25 (not prime).

10. D: 9/11 - When adding fractions with the same denominator, keep the denominator and add numerators: 5/11 + 4/11 = (5 + 4)/11 = 9/11. The denominator stays 11; only add the numerators.

11. C: 48 - Follow order of operations (PEMDAS). Multiply first: 21 × 10 = 210. Then work left to right: 240 − 210 = 30, then 30 + 18 = 48. Multiplication must be done before addition and subtraction.

12. A: 67 - The absolute value of a number is its distance from zero, always positive. |−67| = 67 because −67 is 67 units away from 0 on the number line. Absolute value removes the negative sign.

13. A: 6,700 - When rounding to the nearest hundred, look at the tens digit. In 6,749, the tens digit is 4. Since 4 < 5, round down: the hundreds digit stays 7, making 6,700.

14. B: 4/13 - When subtracting fractions with the same denominator, keep the denominator and subtract numerators: 7/13 − 3/13 = (7 − 3)/13 = 4/13. The denominator stays 13; only subtract the numerators.

15. D: 204 - Follow order of operations. Multiply first: 12 × 11 = 132 and 9 × 8 = 72. Then add: 132 + 72 = 204. Both multiplications must be completed before addition.

16. C: 512 - Calculate the exponent: $8^3 = 8 \times 8 \times 8 = 64 \times 8 = 512$. An exponent indicates how many times to multiply the base by itself. 8 cubed means 8 multiplied by itself three times.

17. A: 294 - Solve n − 91 = 203 by adding 91 to both sides: n = 203 + 91 = 294. Check: 294 − 91 = 203 ✓ To undo subtraction, use addition.

18. E: 72 - A number divisible by both 9 and 8 must be divisible by 72 (the LCM of 9 and 8). Check: 72 ÷ 9 = 8 ✓ and 72 ÷ 8 = 9 ✓. The other options don't divide evenly by both 9 and 8.

19. B: 8/9 - When adding fractions with the same denominator, keep the denominator and add numerators: 4/9 + 4/9 = (4 + 4)/9 = 8/9. The denominator stays 9; only add the numerators.

20. D: 18 - Follow order of operations. Multiply first: 16 × 11 = 176. Then work left to right: 180 − 176 = 4, then 4 + 14 = 18. Multiplication must be done before addition and subtraction.

21. C: 8/33 - When multiplying fractions, multiply numerators together and denominators together: (6 × 4)/(11 × 9) = 24/99. Simplify by dividing both by 3: 24/99 = 8/33. Always simplify after multiplying fractions.

22. A: 0.44 - To convert a fraction to decimal, divide numerator by denominator: 11 ÷ 25 = 0.44. Check by converting back: 0.44 = 44/100 = 11/25 ✓ (after simplifying by 4).

23. E: 166.5 - To find 185% of 90, multiply: 1.85 × 90 = 166.5. Percentages over 100% result in values larger than the original number. 185% means "one and eighty-five hundredths times" the original.

24. B: 3/4 - Simplify 33/44 by finding the GCF of 33 and 44, which is 11. Divide both numerator and denominator by 11: 33 ÷ 11 = 3 and 44 ÷ 11 = 4, giving 3/4. Check: 3/4 = 0.75 and 33/44 = 0.75 ✓

25. D: 2.09 - Line up the decimal points and add: 1.20 + 0.89 = 2.09. When adding decimals, ensure decimal points are aligned vertically for accurate calculation.

26. C: 28 - The ratio 6:7 means for every 6 roses, there are 7 tulips. If there are 24 roses, find how many groups of 6: 24 ÷ 6 = 4 groups. Each group has 7 tulips, so total tulips = 4 × 7 = 28. Or use proportion: 6/7 = 24/x, cross multiply: 6x = 168, so x = 28.

27. A: 143 - To find 55% of 260, multiply: 0.55 × 260 = 143. Mental math: 10% of 260 is 26, so 55% is 5.5 × 26 = 143. Breaking percentages into 10% chunks makes calculation easier.

28. E: 8/9 - Convert to common denominator to compare. Using 72nds: 5/6 = 60/72, 8/9 = 64/72, 7/8 = 63/72. Since 64/72 is largest, 8/9 is greatest. Or convert to decimals: 5/6 ≈ 0.833, 8/9 ≈ 0.889, 7/8 = 0.875. Clearly 0.889 is largest.

29. B: 3.78 - Multiply decimals: 5.4 × 0.7 = 3.78. Count decimal places: 5.4 has 1 decimal place, 0.7 has 1 decimal place, so the product should have 2 decimal places. 54 × 7 = 378, so 5.4 × 0.7 = 3.78.

30. D: $190 - A 90% markup means the selling price is 190% of cost. Calculate: 1.90 × $100 = $190. Or find markup amount: 0.90 × $100 = $90, then add: $100 + $90 = $190. Markup percentages add to the original cost.

31. C: 7/3 - When dividing fractions, multiply by the reciprocal: 7/9 ÷ 1/3 = 7/9 × 3/1 = (7 × 3)/(9 × 1) = 21/9. Simplify by dividing both by 3: 21/9 = 7/3. Dividing by a fraction is the same as multiplying by its reciprocal.

32. A: 9/100 - Write 0.09 as 9/100. This is already in simplest form since 9 and 100 share no common factors other than 1. Check: 9 ÷ 100 = 0.09 ✓

33. E: 40% - Set up the equation: (x/100) × 80 = 32. Solve: 80x = 3200, so x = 40. Therefore 32 is 40% of 80. Or think: 32/80 = 2/5 = 40/100 = 40%.

34. B: 7 1/12 - Convert to improper fractions: 2 3/4 = 11/4 and 4 1/3 = 13/3. Find common denominator (12): 11/4 = 33/12 and 13/3 = 52/12. Add: 33/12 + 52/12 = 85/12. Convert back to mixed number: 85 ÷ 12 = 7 remainder 1, so 7 1/12.

35. D: 49 - If 6/7 of a number equals 42, set up equation: (6/7)n = 42. Multiply both sides by 7/6: n = 42 × (7/6) = 294/6 = 49. Check: (6/7) × 49 = 294/7 = 42 ✓

36. C: 3:4 - Simplify the ratio 48:64 by dividing both numbers by their GCF, which is 16. 48 ÷ 16 = 3 and 64 ÷ 16 = 4, giving 3:4. Check: 3 × 16 = 48 and 4 × 16 = 64 ✓

37. A: 4.85 - Align decimal points and subtract: 9.70 − 4.85 = 4.85. When subtracting, you may need to rewrite 9.7 as 9.70 to align decimal places properly. Borrowing works the same as with whole numbers.

38. E: $250 - If $200 is the price after a 20% discount, it represents 80% of the original price. Set up equation: 0.80x = 200. Solve: x = 200 ÷ 0.80 = 250. Check: 0.80 × $250 = $200 ✓ Working backwards from a discount requires dividing by the remaining percentage.

39. B: 11/15 - When adding fractions with the same denominator, keep the denominator and add numerators: 7/15 + 4/15 = (7 + 4)/15 = 11/15. The denominator stays 15; only add the numerators.

40. D: 40 - If m:n = 8:5 and m = 64, set up proportion: 8/5 = 64/n. Cross multiply: 8n = 320. Divide: n = 40. Check the ratio: 64:40 = 8:5 ✓ (after dividing both by 8).

41. C: 7 - Solve 5y + 17 = 52 in two steps. Subtract 17 from both sides: 5y = 35. Divide both sides by 5: y = 7. Check: 5(7) + 17 = 35 + 17 = 52 ✓

42. A: 82 - Substitute values: 6p + 5q = 6(7) + 5(8) = 42 + 40 = 82. Always perform multiplication before addition when evaluating expressions.

43. E: 7 - Solve $8r - 13 = 43$ in two steps. Add 13 to both sides: $8r = 56$. Divide both sides by 8: $r = 7$. Check: $8(7) - 13 = 56 - 13 = 43$ ✓

44. B: 7b + 42 - Distribute the 7 to both terms inside the parentheses: $7(b + 6) = 7 \cdot b + 7 \cdot 6 = 7b + 42$. Distribution means multiplying each term inside by the number outside.

45. D: 196 - Calculate the exponent: $z^2 = 14^2 = 14 \times 14 = 196$. Squaring a number means multiplying it by itself.

46. C: 117 - Solve $m/9 = 13$ by multiplying both sides by 9: $m = 13 \times 9 = 117$. Check: $117 \div 9 = 13$ ✓ Multiplication undoes division.

47. A: 1 - Solve $6(x + 7) = 48$ by first dividing both sides by 6: $x + 7 = 8$. Then subtract 7: $x = 1$. Check: $6(1 + 7) = 6(8) = 48$ ✓

48. E: 13w - Combine like terms: $5w + 8w = (5 + 8)w = 13w$. When adding terms with the same variable, add the coefficients and keep the variable.

49. B: 39 - First substitute $s = 6$: $9s - 5s + 15 = 9(6) - 5(6) + 15$. Then calculate: $54 - 30 + 15 = 39$. Combine like terms first if possible: $(9s - 5s) + 15 = 4s + 15 = 4(6) + 15 = 24 + 15 = 39$.

50. D: 13 - Solve $11d = 143$ by dividing both sides by 11: $d = 143 \div 11 = 13$. Check: $11 \times 13 = 143$ ✓ Division is the inverse of multiplication.

51. C: 84 - Perimeter of a square = 4 × side length = $4 \times 21 = 84$. All four sides of a square are equal, so multiply one side by 4.

52. E: 493 - Area of rectangle = length × width = $29 \times 17 = 493$ square units. Don't confuse with perimeter, which would be $2(29 + 17) = 92$.

53. E: 69.08 - Circumference = $2\pi r = 2 \times 3.14 \times 11 = 69.08$. The formula uses radius, not diameter. Circumference is the distance around a circle.

54. B: 342 - Area of triangle = (base × height) ÷ 2 = $(36 \times 19) \div 2 = 684 \div 2 = 342$ square units. A triangle's area is always half that of a rectangle with the same base and height.

55. D: 560 - Volume of rectangular box = length × width × height = $8 \times 7 \times 10 = 560$ cubic units. Volume measures the space inside a three-dimensional object.

56. C: 45 - An equilateral triangle has all three sides equal. If one side is 15, perimeter = $3 \times 15 = 45$. Equilateral means "equal-sided."

57. A: 706.5 - Area of circle = $\pi r^2 = 3.14 \times 15^2 = 3.14 \times 225 = 706.5$ square units. Don't confuse area (πr^2) with circumference ($2\pi r$).

58. E: 164 feet - Perimeter of rectangle = 2(length + width) = 2(50 + 32) = 2(82) = 164 feet. Walking around the perimeter means covering all four sides.

59. B: 420 - Area of parallelogram = base × height = 28 × 15 = 420 square units. Like a rectangle, multiply base times height, not times the slanted side.

60. D: 512 - Volume of cube = edge³ = 8³ = 8 × 8 × 8 = 512 cubic units. A cube has all edges equal, so volume is side cubed.

61. C: $73 - Calculate pens: 6 × $8 = $48. Calculate notebooks: 5 × $5 = $25. Total: $48 + $25 = $73. Break multi-step problems into simpler calculations.

62. A: 70 mph - Average speed = distance ÷ time = 350 miles ÷ 5 hours = 70 mph. Speed tells how far you travel per unit of time.

63. E: $37 - Calculate total spent: $36 + $45 = $81. Subtract from original amount: $118 − $81 = $37 remaining. Work through money problems step by step.

64. B: 16 - Divide total items by items per box: 256 ÷ 16 = 16 boxes. Check: 16 × 16 = 256 ✓ Division helps distribute items into equal groups.

65. D: 5600 meters - Total distance = laps × meters per lap = 8 × 700 = 5600 meters. Multiplication finds total when you have equal groups.

66. C: 8:45 PM - From 5:20 PM, add 3 hours 25 minutes. Add 3 hours: 5:20 + 3:00 = 8:20. Add 25 minutes: 8:20 + 0:25 = 8:45 PM. Break time calculations into hours and minutes separately.

67. A: 9 days - Divide total pages by pages per day: 540 ÷ 60 = 9 days. Check: 9 × 60 = 540 ✓ Division finds how many equal groups fit into a total.

68. E: 23°C - Add the temperature increase: 4°C + 19°C = 23°C. Temperature increase means addition, while temperature decrease means subtraction.

69. B: 5/8 - If Alex eats 6 out of 16 slices, remaining = 16 − 6 = 10 slices out of 16 total = 10/16. Simplify: 10/16 = 5/8. Subtraction finds what remains.

70. D: 3200 cubic meters - Volume = length × width × depth = 40 × 16 × 5 = 3200 cubic meters. Volume requires all three dimensions multiplied together.

71. C: 26 - Average = sum ÷ count. Sum: 20 + 28 + 24 + 32 = 104. Count: 4 numbers. Average: 104 ÷ 4 = 26. The average (mean) is the sum divided by how many numbers.

72. A: $936 - Revenue = price × quantity = $18 × 52 = $936. Multiplication finds total revenue from unit price and quantity sold.

73. E: 11 - To find median, arrange in order: 6, 7, 11, 14, 17. The middle value (third out of five) is 11. The median is the middle value when numbers are arranged in order.

74. B: 267 - The sequence adds 29 each time. 1st: 35. 2nd: 35 + 29 = 64. 3rd: 64 + 29 = 93. 4th: 93 + 29 = 122. 5th: 122 + 29 = 151. 6th: 151 + 29 = 180. 7th: 180 + 29 = 209. 8th: 209 + 29 = 238. 9th: 238 + 29 = 267. Count carefully through arithmetic sequences.

75. D: 100 inches - Use Pythagorean theorem: $a^2 + b^2 = c^2$. Here: $80^2 + 60^2 = c^2$. Calculate: 6400 + 3600 = 10000. Therefore $c^2 = 10000$, so c = 100 inches. This is a multiple of the 3-4-5 right triangle (multiplied by 20).

76. C: 1/3 - Numbers greater than 4 on a die: 5 and 6 (that's 2 outcomes out of 6 possible). Probability = 2/6 = 1/3. Count favorable outcomes over total possible outcomes.

77. A: 312 miles - Distance = speed × time = 78 mph × 4 hours = 312 miles. Multiply rate by time to find total distance traveled.

78. E: 9 - The mode is the number that appears most frequently. Count: 9 appears 3 times, 12 appears 2 times, 16 appears 1 time, 13 appears 1 time. Mode = 9. The mode is the most common value.

79. B: 14 - Divide total cookies by cookies per box: 224 ÷ 16 = 14 boxes. Check: 14 × 16 = 224 ✓ Division helps organize items into equal containers.

80. D: 22 - Range = highest value − lowest value. Highest: 40. Lowest: 18. Range: 40 − 18 = 22. The range shows the spread of data.

81. C: 45° - Sum of angles in a triangle = 180°. Given angles: 60° + 75° = 135°. Third angle: 180° − 135° = 45°. All triangle angles always sum to exactly 180°.

82. A: 28 inches - Divide total rope by number of pieces: 196 ÷ 7 = 28 inches per piece. Check: 7 × 28 = 196 ✓ Division creates equal parts.

83. E: 252 - Area of trapezoid = $(b_1 + b_2) \times h \div 2 = (16 + 20) \times 14 \div 2 = 36 \times 14 \div 2 = 504 \div 2 = 252$ square units. The trapezoid formula averages the two bases, then multiplies by height.

84. B: approximately 11 - Work backwards. If result is 90 after subtracting 30, then before subtracting: 90 + 30 = 120. If squaring gave 120, the number is $\sqrt{120} \approx 10.95 \approx 11$. Check: $11^2 - 30 = 121 - 30 = 91 \approx 90$ ✓ (close approximation).

85. D: 18 - Perimeter of rectangle = 2(length + width) = 90. So length + width = 45. If length = 27, then width = 45 − 27 = 18. Check: 2(27 + 18) = 2(45) = 90 ✓

86. C: 44.1 - Calculate step by step. 45% of 280 = 0.45 × 280 = 126. Then 35% of 126 = 0.35 × 126 = 44.1. Or combine: 0.35 × 0.45 × 280 = 0.1575 × 280 = 44.1.

87. A: 5/12 - Total marbles: 8 + 6 + 10 = 24. Green marbles: 10. Probability = 10/24 = 5/12 (after simplifying by 2). Count specific outcomes over total possible outcomes.

88. E: 294 - Surface area of cube = $6s^2 = 6 \times 7^2 = 6 \times 49 = 294$ square units. A cube has 6 faces, each with area s^2.

89. B: 567 - Examine pattern: each number is multiplied by 3. 7 × 3 = 21, 21 × 3 = 63, 63 × 3 = 189, 189 × 3 = 567. This is a geometric sequence with ratio 3.

90. D: $262.50 - First discount: \$500 × 0.70 = \$350 (after 30% off). Second discount: \$350 × 0.75 = \$262.50 (after additional 25% off the sale price). Sequential discounts multiply: 0.70 × 0.75 = 0.525, so final price is 52.5% of original.

91. C: 17 - Solve $8x - 20 = 6x + 14$ by getting variables on one side. Subtract 6x from both sides: $2x - 20 = 14$. Add 20 to both sides: $2x = 34$. Divide by 2: $x = 17$. Check: $8(17) - 20 = 136 - 20 = 116$ and $6(17) + 14 = 102 + 14 = 116$ ✓

92. A: 28 - Substitute values: $p^2 - q^2 = 8^2 - 6^2 = 64 - 36 = 28$. This can also be factored using the difference of squares formula: $p^2 - q^2 = (p + q)(p - q) = (8 + 6)(8 - 6) = 14 \times 2 = 28$.

93. E: 15 - Solve $5(t - 9) = 30$ by dividing both sides by 5 first: $t - 9 = 6$. Then add 9 to both sides: $t = 15$. Check: $5(15 - 9) = 5(6) = 30$ ✓

94. B: 13y - Combine like terms: $14y - 6y + 5y = (14 - 6 + 5)y = 13y$. Work left to right: $14y - 6y = 8y$, then $8y + 5y = 13y$.

95. D: 500 - Substitute $n = 10$: $5n^2 = 5(10^2) = 5(100) = 500$. Remember to calculate the exponent first, then multiply by 5.

96. C: 27 - Solve $4x/9 = 12$ by multiplying both sides by 9: $4x = 108$. Then divide by 4: $x = 27$. Check: $4(27)/9 = 108/9 = 12$ ✓

97. A: 1 - Solve $7(k + 8) = 63$ by dividing both sides by 7 first: $k + 8 = 9$. Then subtract 8 from both sides: $k = 1$. Check: $7(1 + 8) = 7(9) = 63$ ✓

98. E: 29 - Substitute $a = 9$: $6a - 4a + 11 = 6(9) - 4(9) + 11 = 54 - 36 + 11 = 29$. Combine like terms first if possible: $(6a - 4a) + 11 = 2a + 11 = 2(9) + 11 = 18 + 11 = 29$.

99. B: 13 - Solve $9c = 117$ by dividing both sides by 9: $c = 117 \div 9 = 13$. Check: $9 \times 13 = 117$ ✓ Division is the inverse of multiplication.

100. D: 256 - Substitute values: $(m + n)^2 = (7 + 9)^2 = 16^2 = 256$. When squaring a sum, add first, then square the result. This is different from $m^2 + n^2$, which would be 49 + 81 = 130.