BONUS PRACTICE TEST 1

Section 1: Quantitative

1. What is 616 ÷ 44?

A. 14

B. 13

C. 15

D. 16

E. 12

2. If 3x + 17 = 68, then x =

A. 85

B. 51

C. 17

D. 3

E. 18

3. Which of the following is a prime number?

A. 15

B. 21

C. 27

D. 33

E. 37

4. What is $8^2 + 6^2$ =

A. 196

B. 100

C. 64

D. 36

E. 14

5. If $n - 97 = 148$, then $n =$

A. 51

B. 97

C. 148

D. 245

E. 197

6. What is the greatest common factor (GCF) of 48 and 72?

A. 24

B. 12

C. 8

D. 6

E. 144

7. Evaluate: $15 + 18 \div 3 - 4$

A. 7

B. 15

C. 17

D. 11

E. 9

8. Which fraction is equivalent to 0.375?

A. 3/4

B. 3/10

C. 37/100

D. 3/5

E. 3/8

9. What is 25% of 84?

A. 25

B. 21

C. 42

D. 84

E. 18

10. If 5y = 85, then y =

A. 80

B. 90

C. 5

D. 17

E. 15

11. What is |-23|?

A. 23

B. -23

C. 0

D. 46

E. -46

12. Round 7,849 to the nearest hundred.

A. 7,800

B. 7,850

C. 7,900

D. 8,000

E. 7,840

13. What is 3/5 + 1/5?

A. 3/5

B. 4/10

C. 1/5

D. 2/5

E. 4/5

14. Evaluate: (12 + 8) × 2 − 15

A. 35

B. 25

C. 45

D. 5

E. 55

15. What is the value of 4^3?

A. 12

B. 16

C. 48

D. 64

E. 81

16. If a + 42 = 119, then a =

A. 77

B. 161

C. 42

D. 119

E. 87

17. What is $7 \times 9 + 3 \times 4$?

A. 84

B. 63

C. 75

D. 51

E. 12

18. Which number is divisible by both 3 and 4?

A. 18

B. 20

C. 22

D. 26

E. 36

19. What is $5/6 - 1/6$?

A. 4/6

B. 2/3

C. 1/2

D. 5/6

E. 1/3

20. Evaluate: $100 - 15 \times 6 + 5$

A. 515

B. 95

C. 505

D. 15

E. 25

21. What is 3/4 × 2/5?

A. 3/10

B. 5/9

C. 6/20

D. 2/3

E. 1/2

22. Convert 7/20 to a decimal.

A. 0.7

B. 0.07

C. 0.35

D. 0.2

E. 0.72

23. What is 150% of 60?

A. 60

B. 75

C. 100

D. 120

E. 90

24. Simplify: 18/24

A. 9/12

B. 3/4

C. 6/8

D. 2/3

E. 1/2

25. What is 0.6 + 0.45?

A. 0.51

B. 0.69

C. 0.15

D. 1.05

E. 1.50

26. The ratio of boys to girls in a class is 3:4. If there are 12 boys, how many girls are there?

A. 16

B. 9

C. 15

D. 18

E. 12

27. What is 40% of 175?

A. 40

B. 175

C. 70

D. 140

E. 35

28. Which is greatest: 2/3, 5/8, or 3/4?

A. 2/3

B. 5/8

C. They're equal

D. Cannot determine

E. 3/4

29. What is 2.5 × 0.4?

A. 10

B. 1

C. 0.1

D. 2.9

E. 6.25

30. A store marks up items 60% above cost. If an item costs $50, what is the selling price?

A. $60

B. $110

C. $30

D. $80

E. $90

31. What is 5/8 ÷ 1/4?

A. 5/2

B. 5/32

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. 2/25

D. 8/100

E. 1/8

33. What percent of 80 is 20?

A. 20%

B. 40%

C. 4%

D. 80%

E. 25%

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

A. 3 1/4

B. 4 1/4

C. 3 3/4

D. 4 1/2

E. 3 5/4

35. If 3/5 of a number is 45, what is the number?

A. 27

B. 15

C. 90

D. 75

E. 60

36. What is the ratio of 24 to 36 in simplest form?

A. 2:3

B. 3:4

C. 4:6

D. 12:18

E. 1:2

37. What is 8.7 − 3.95?

A. 4.95

B. 5.75

C. 4.75

D. 5.25

E. 4.25

38. A jacket costs $120 after a 25% discount. What was the original price?

A. $90

B. $145

C. $150

D. $130

E. $160

39. What is 3/7 + 2/7?

A. 5/14

B. 5/7

C. 1

D. 6/7

E. 3/7

40. If x:y = 5:8 and x = 30, what is y?

A. 50

B. 40

C. 24

D. 48

E. 60

41. Solve for x: 2x + 9 = 31

A. 11

B. 40

C. 22

D. 2

E. 20

42. What is the value of 3a + 2b when a = 4 and b = 5?

A. 17

B. 20

C. 22

D. 30

E. 12

43. If 5m − 7 = 28, then m =

A. 21

B. 35

C. 5

D. 4

E. 7

44. Simplify: $4(x + 3)$

A. $4x + 3$

B. $4x + 12$

C. $x + 12$

D. $4x + 7$

E. $7x$

45. What is the value of y^2 when $y = 9$?

A. 18

B. 9

C. 27

D. 81

E. 72

46. Solve: $x/6 = 7$

A. 42

B. 13

C. 1

D. 6

E. 7

47. If $3(n + 4) = 27$, then $n =$

A. 5

B. 9

C. 7

D. 11

E. 3

48. What is $2x + 3x$?

A. $5x^2$

B. $6x$

C. 5

D. $2x$

E. $5x$

49. Evaluate: $5p - 2p + 8$ when $p = 3$

A. 15

B. 17

C. 11

D. 14

E. 21

50. If $7a = 84$, then $a =$

A. 77

B. 91

C. 7

D. 12

E. 14

51. Simplify: $6b + 4b - 3b$

A. $7b$

B. $13b$

C. $3b$

D. $10b$

E. b

52. What is the value of $2x - 5$ when $x = 10$?

A. 5

B. 20

C. 15

D. 10

E. 25

53. Solve for y: $y/8 + 3 = 10$

A. 80

B. 13

C. 104

D. 7

E. 56

54. If $4(x - 2) = 20$, then $x =$

A. 3

B. 7

C. 5

D. 8

E. 6

55. What is $3n \times 2n$?

A. $5n$

B. $5n^2$

C. $6n$

D. $6n^2$

E. $3n^2$

56. Evaluate: $(x + y)/2$ when $x = 14$ and $y = 10$

A. 12

B. 24

C. 2

D. 14

E. 10

57. Solve: $5x - 12 = 3x + 8$

A. 4

B. 20

C. 10

D. 5

E. 2

58. What is the value of $a^2 + b^2$ when $a = 3$ and $b = 4$?

A. 7

B. 49

C. 12

D. 24

E. 25

59. If $2(p + 5) = 22$, then $p =$

A. 11

B. 6

C. 12

D. 5

E. 7

60. Simplify: $8x - 3x + 2x$

A. $3x$

B. $13x$

C. $5x$

D. $7x$

E. $10x$

61. What is the perimeter of a square with side length 15?

A. 60

B. 225

C. 30

D. 45

E. 15

62. A rectangle has length 18 and width 11. What is its area?

A. 29

B. 58

C. 198

D. 180

E. 200

63. What is the circumference of a circle with radius 7? (Use $\pi \approx 3.14$)

A. 21.98

B. 28

C. 14

D. 153.86

E. 43.96

64. A triangle has a base of 24 and height of 13. What is its area?

A. 37

B. 156

C. 312

D. 74

E. 180

65. What is the volume of a rectangular box with dimensions $5 \times 4 \times 6$?

A. 15

B. 24

C. 30

D. 120

E. 140

66. An equilateral triangle has one side of length 9. What is its perimeter?

A. 27

B. 18

C. 36

D. 9

E. 45

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

A. 31.4

B. 62.8

C. 314

D. 100

E. 628

68. A rectangular garden is 30 feet long and 20 feet wide. If you walk around its perimeter, how far do you walk?

A. 50 feet

B. 600 feet

C. 60 feet

D. 90 feet

E. 100 feet

69. What is the area of a parallelogram with base 16 and height 9?

A. 25

B. 144

C. 72

D. 50

E. 88

70. A cube has edge length 5. What is its volume?

A. 15

B. 25

C. 75

D. 125

E. 150

71. Sarah buys 3 notebooks at $4 each and 2 pens at $2 each. How much does she spend?

A. $16

B. $12

C. $14

D. $10

E. $18

72. A train travels 240 miles in 4 hours. What is its average speed?

A. 236 mph

B. 244 mph

C. 60 mph

D. 80 mph

E. 40 mph

73. Tom has $85. He spends $23 on lunch and $31 on a book. How much does he have left?

A. $139

B. $54

C. $62

D. $8

E. $31

74. A store has 156 apples. If they put 12 apples in each basket, how many baskets do they need?

A. 144

B. 13

C. 12

D. 156

E. 14

75. Maria runs 5 laps around a track. If each lap is 400 meters, how far does she run?

A. 405 meters

B. 80 meters

C. 395 meters

D. 2000 meters

E. 1600 meters

76. A movie starts at 2:45 PM and lasts 2 hours and 30 minutes. What time does it end?

A. 5:15 PM

B. 4:15 PM

C. 5:45 PM

D. 4:45 PM

E. 6:15 PM

77. A book has 360 pages. Carlos reads 45 pages per day. How many days will it take him to finish?

A. 405 days

B. 315 days

C. 8 days

D. 9 days

E. 7 days

78. The temperature was 5°C in the morning and rose 12°C by afternoon. What was the afternoon temperature?

A. 7°C

B. −7°C

C. 60°C

D. 12°C

E. 17°C

79. A pizza is cut into 8 equal slices. If Josh eats 3 slices, what fraction of the pizza remains?

A. 3/8

B. 5/8

C. 1/2

D. 3/5

E. 2/8

80. A rectangular pool is 25 meters long, 10 meters wide, and 2 meters deep. What is its volume?

A. 37 cubic meters

B. 250 cubic meters

C. 50 cubic meters

D. 500 cubic meters

E. 70 cubic meters

81. What is the average of 15, 23, 18, and 28?

A. 21

B. 84

C. 23

D. 20

E. 22

82. A store sells shirts for $18 each. If they sell 45 shirts, how much revenue do they make?

A. $63

B. $27

C. $810

D. $720

E. $900

83. What is the median of the following numbers: 4, 9, 3, 11, 7?

A. 4

B. 9

C. 11

D. 3

E. 7

84. A sequence follows the rule: add 19. If the first term is 23, what is the 6th term?

A. 42

B. 118

C. 99

D. 138

E. 80

85. A rectangular poster is 48 inches long and 36 inches wide. What is the length of its diagonal? (Use the Pythagorean theorem: $a^2 + b^2 = c^2$)

A. 84 inches

B. 12 inches

C. 42 inches

D. 60 inches

E. 72 inches

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

A. 1/3

B. 1/2

C. 2/3

D. 1/6

E. 5/6

87. A car travels at 55 mph for 3 hours. How far does it travel?

A. 58 miles

B. 52 miles

C. 165 miles

D. 185 miles

E. 150 miles

88. What is the mode of the following numbers: 5, 8, 5, 12, 5, 9, 8?

A. 8

B. 12

C. 9

D. 7

E. 5

89. A baker makes 144 cupcakes and packs them in boxes of 12. How many boxes does he need?

A. 132

B. 12

C. 156

D. 144

E. 10

90. What is the range of the following numbers: 18, 25, 11, 30, 19?

A. 18

B. 25

C. 11

D. 19

E. 21

91. A triangle has angles measuring 45° and 65°. What is the measure of the third angle?

A. 70°

B. 110°

C. 180°

D. 45°

E. 65°

92. A rope 120 inches long is cut into 3 equal pieces. How long is each piece?

A. 117 inches

B. 360 inches

C. 40 inches

D. 60 inches

E. 30 inches

93. What is the area of a trapezoid with bases 10 and 14, and height 8? (Area = $(b_1 + b_2) \times h \div 2$)

A. 24

B. 32

C. 192

D. 112

E. 96

94. A number is squared, then 15 is subtracted. The result is 49. What is the number?

A. 7

B. 8

C. 34

D. 64

E. 4

95. The perimeter of a rectangle is 54. If the length is 18, what is the width?

A. 36

B. 27

C. 72

D. 9

E. 12

96. What is 30% of 40% of 200?

A. 24

B. 80

C. 12

D. 70

E. 60

97. A bag contains 5 red, 3 blue, and 7 green marbles. What is the probability of selecting a blue marble?

A. 3/15

B. 5/15

C. 1/5

D. 7/15

E. 3/12

98. What is the surface area of a cube with edge length 4? (Surface area = $6s^2$)

A. 24

B. 64

C. 16

D. 48

E. 96

99. If a pattern continues 3, 9, 27, 81, what is the next number?

A. 108

B. 243

C. 162

D. 324

E. 729

100. A store offers a 15% discount, then an additional 10% discount on the sale price. What is the final price of a $200 item?

A. $170

B. $150

C. $180

D. $153

E. $160

Section 2: Reading

Passage 1

Monarch butterflies migrate up to 3,000 miles from North America to Mexico each fall. No single butterfly completes the round trip—it takes four to five generations. "Super generation" butterflies born in late fall live eight months instead of the usual six weeks, allowing them to make the journey south without reproducing.

1. The monarch migration is unique because

A. butterflies fly very fast

B. all butterflies are identical

C. no individual completes the entire round trip

D. it only takes one week

E. butterflies don't eat

2. "Super generation" butterflies differ by

A. being larger

B. having spots

C. flying at night

D. never migrating

E. living much longer than normal

3. During the southward migration, super generation butterflies

A. reproduce constantly

B. stop to lay eggs

C. fly both day and night

D. don't migrate at all

E. conserve energy by not reproducing

4. How many generations complete the full migration cycle?

A. four to five

B. two

C. one

D. ten

E. twenty

5. Monarchs travel from North America to

A. Canada

B. South America

C. Europe

D. Mexico

E. Asia

Passage 2

My grandmother's kitchen always smelled like cinnamon and stories. At twelve, I didn't understand why she cried making her mother's recipes. Now at twenty-seven, living far from family, I called her three times trying to recreate her kibbeh. When I finally tasted it, I understood: food isn't just food—it's memory and connection.

6. The grandmother's kitchen smelled like

A. roses

B. meat

C. cinnamon

D. bread

E. coffee

7. At age twelve, the narrator

A. loved cooking

B. understood loneliness

C. wanted to travel

D. lived abroad

E. didn't understand grandmother's emotions

8. The narrator called her grandmother three times because

A. she was lonely

B. written recipes don't capture technique

C. the phone broke

D. she forgot completely

E. she was bored

9. By age twenty-seven, the narrator

A. understood her grandmother's feelings about food

B. forgot the recipes

C. moved back home

D. stopped cooking

E. became a chef

10. According to the passage, food represents

A. just nutrition

B. expensive ingredients

C. restaurant quality

D. memory and connection

E. professional skill

Passage 3

Sleep cycles through stages: light sleep, deep sleep, and REM sleep. Deep sleep repairs tissues and strengthens immunity. REM sleep, when vivid dreams occur, helps process emotions and consolidate

memories. Adults need 7-9 hours nightly. Chronic sleep deprivation impairs decision-making, weakens emotional control, and compromises immune function.

11. Deep sleep is important for

A. dreaming only

B. staying awake

C. tissue repair and immunity

D. eating

E. exercise

12. REM sleep is characterized by

A. no brain activity

B. deep rest

C. muscle building

D. slow breathing

E. vivid dreams and memory consolidation

13. Adults need how many hours of sleep?

A. 3-5 hours

B. 7-9 hours

C. 10-12 hours

D. 15 hours

E. 20 hours

14. Chronic sleep deprivation affects

A. decision-making, emotions, and immunity

B. hair color only

C. shoe size

D. nothing

E. height

15. During REM sleep, the brain

A. shuts down completely

B. stops working

C. sleeps deeply

D. becomes highly active

E. repairs bones

Passage 4

Venus flytraps are carnivorous plants native to North Carolina bogs. Their hinged leaves snap shut in less than a second when trigger hairs are touched twice within twenty seconds—this prevents wasting energy on rain or debris. The trapped insect is digested over 5-12 days, providing nitrogen the plant can't get from nutrient-poor soil.

16. Venus flytraps are native to

A. California

B. Texas

C. North Carolina

D. Florida

E. New York

17. The trap closes when trigger hairs are touched

A. once

B. never

C. three times

D. continuously

E. twice within twenty seconds

18. The two-touch mechanism prevents

A. growing too fast

B. wasting energy on non-food items

C. catching too much

D. dying

E. flowering

19. Digestion of an insect takes

A. one hour

B. one minute

C. one year

D. five seconds

E. 5-12 days

20. Venus flytraps need insects for

A. fun

B. water

C. oxygen

D. nitrogen from nutrient-poor soil

E. sunlight

Passage 5

I didn't mean to break Mr. Chen's telescope. I was adjusting the focus for the astronomy club presentation when it slipped. The lens shattered. Instead of hiding it, I left a note confessing and offered to pay from my savings. Mr. Chen said my honesty meant more than the telescope, and he helped me learn to repair it properly.

21. The narrator broke

A. a window

B. a microscope

C. a telescope

D. a camera

E. a computer

22. The telescope broke while

A. running

B. sleeping

C. eating

D. reading

E. adjusting the focus

23. Instead of hiding the broken telescope, the narrator

A. ran away

B. left a confession note

C. blamed someone else

D. fixed it secretly

E. threw it away

24. The narrator offered to

A. pay from savings

B. quit the club

C. transfer schools

D. ignore it

E. buy a new hobby

25. Mr. Chen's response emphasized that

A. telescopes are cheap

B. astronomy is easy

C. mistakes are fine

D. honesty was more valuable than the telescope

E. clubs don't matter

Passage 6

Octopuses are remarkably intelligent invertebrates. They can solve puzzles, use tools, and even recognize individual humans. With about 500 million neurons—two-thirds located in their arms—octopuses demonstrate decentralized intelligence. Each arm can "think" semi-independently, allowing the octopus to explore multiple directions simultaneously while the brain handles complex decisions.

26. Octopuses can

A. fly

B. live on land permanently

C. solve puzzles and use tools

D. breathe air only

E. live for centuries

27. Approximately how many neurons do octopuses have?

A. 100

B. 1,000

C. 10,000

D. 1 million

E. 500 million

28. Two-thirds of octopus neurons are located in

A. the head only

B. their arms

C. their eyes

D. their skin

E. their stomach

29. Octopus arms can

A. think semi-independently

B. never move

C. only follow brain commands

D. not sense anything

E. detach permanently

30. The decentralized intelligence allows octopuses to

A. sleep longer

B. change color

C. swim faster

D. explore multiple directions simultaneously

E. avoid water

Passage 7

The letter was simple: "You're invited to join the advanced math program." I stared at it, heart pounding. Advanced meant harder work, more pressure, possibly failing. But it also meant challenge, growth, and believing I could handle difficult things. I checked the box marked "Yes" before fear could change my mind. Sometimes courage is just choosing growth over comfort.

31. The letter invited the narrator to

A. a party

B. summer camp

C. advanced math program

D. sports team

E. art class

32. The narrator's initial reaction was

A. immediate excitement

B. complete indifference

C. not caring at all

D. boredom

E. heart pounding with mixed feelings

33. Advanced math meant

A. less work

B. harder work and more pressure

C. easier classes

D. no homework

E. graduating early

34. The narrator chose to

A. accept the invitation

B. decline immediately

C. ignore the letter

D. ask friends to decide

E. transfer schools

35. According to the passage, courage sometimes means

A. avoiding all risks

B. never trying hard things

C. always playing safe

D. choosing growth over comfort

E. quitting when scared

Passage 8

Bioluminescent algae, called dinoflagellates, create glowing blue waves when disturbed. This light production, caused by chemical reactions, serves as a defense mechanism—the sudden brightness can startle predators or attract larger predators to eat whatever is disturbing the algae. This phenomenon turns nighttime beaches into magical, glowing landscapes during algae blooms.

36. Bioluminescent algae are called

A. plankton

B. seaweed

C. dinoflagellates

D. coral

E. jellyfish

37. The algae glow when

A. sleeping

B. eating

C. reproducing

D. growing

E. disturbed

38. The light serves as

A. food

B. a defense mechanism

C. decoration

D. exercise

E. reproduction

39. The sudden brightness can

A. startle predators or attract their predators

B. help them swim

C. create oxygen

D. warm the water

E. clean the ocean

40. The phenomenon is visible during

A. daytime only

B. winter only

C. storms only

D. algae blooms at night

E. full moons only

Passage 9

The Rosetta Stone, discovered in 1799, was key to deciphering Egyptian hieroglyphs. The stone contains the same text in three scripts: hieroglyphs, Demotic Egyptian, and ancient Greek. Since scholars could read Greek, they used it to decode the other two scripts, unlocking 3,000 years of previously unreadable Egyptian history.

41. The Rosetta Stone was discovered in

A. 1899

B. 1699

C. 1799

D. 1999

E. 1599

42. The stone contains text in how many scripts?

A. one

B. two

C. five

D. ten

E. three

43. Scholars could already read

A. hieroglyphs

B. ancient Greek

C. Demotic only

D. none of them

E. all of them

44. The stone was key to

A. deciphering hieroglyphs

B. building pyramids

C. finding gold

D. cooking recipes

E. predicting weather

45. Decoding the stone unlocked how many years of history?

A. 100

B. 500

C. 1,000

D. 3,000

E. 10,000

Passage 10

Maria's phone buzzed during dinner. "Can you work my shift tomorrow? Family emergency." It was Jamal, who'd covered for her twice last month. Tomorrow was her only day off in two weeks, and she'd planned to catch up on sleep. But she remembered Jamal's kindness and texted back: "Of course. Hope everything's okay." Sometimes being a good coworker means being a good human first.

46. The text came from

A. Maria's mom

B. her boss

C. Jamal

D. a stranger

E. her teacher

47. Jamal needed someone to

A. study with

B. have dinner

C. go shopping

D. drive somewhere

E. work his shift

48. Tomorrow was Maria's

A. birthday

B. only day off in two weeks

C. first day at work

D. last day of school

E. vacation start

49. Maria had planned to

A. travel

B. go shopping

C. visit family

D. study

E. catch up on sleep

50. Maria agreed because

A. she had nothing else to do

B. she wanted extra money

C. her boss ordered her

D. Jamal had helped her before

E. she didn't receive the text

Passage 11

Tardigrades, called "water bears," are microscopic animals that survive extreme conditions. They can withstand temperatures from near absolute zero to 300°F, pressure six times deeper than the ocean's deepest point, and even the vacuum of space. In harsh conditions, they enter cryptobiosis—a death-like state where metabolism nearly stops—and can survive for decades until conditions improve.

51. Tardigrades are also called

A. sea lions

B. space dogs

C. water bears

D. ice worms

E. rock spiders

52. They can survive temperatures

A. only at room temperature

B. only when warm

C. only when cold

D. in a narrow range

E. from near absolute zero to 300°F

53. In harsh conditions, tardigrades enter

A. hibernation

B. cryptobiosis

C. sleep

D. reproduction

E. growth

54. During cryptobiosis, their metabolism

A. nearly stops

B. increases

C. doubles

D. speeds up

E. becomes very active

55. Tardigrades can survive in this state for

A. minutes

B. hours

C. a few days

D. decades

E. seconds

Passage 12

The note taped to my locker read: "Everyone knows what you did. You should be ashamed." My hands shook. I hadn't done anything wrong—or had I? Doubt crept in. Then my friend Zara appeared. "Ignore it," she said. "Someone's trying to make you feel small. Don't let them." She helped me take it down, and together we threw it away. Sometimes friendship is just showing up when someone's being torn down.

56. The note was taped to

A. a door

B. a window

C. the narrator's locker

D. a desk

E. the ceiling

57. The note's message was

A. congratulatory

B. friendly

C. inviting

D. supportive

E. shaming

58. After reading the note, the narrator

A. laughed

B. felt doubtful and shaken

C. ignored it completely

D. felt proud

E. celebrated

59. Zara advised the narrator to

A. ignore the note

B. find who wrote it

C. write back

D. tell teachers

E. move schools

60. According to the passage, friendship sometimes means

A. ignoring people

B. writing notes

C. being competitive

D. showing up when someone's being torn down

E. avoiding conflict

Passage 13

Photosynthesis is the process by which plants convert sunlight into chemical energy. Using chlorophyll in their leaves, plants capture light energy and combine water and carbon dioxide to produce glucose and oxygen. This process not only feeds the plant but also generates the oxygen that most life on Earth requires to survive.

61. Photosynthesis converts

A. water to soil

B. oxygen to carbon dioxide

C. sunlight into chemical energy

D. plants to animals

E. soil to water

62. The pigment that captures light is

A. hemoglobin

B. melanin

C. protein

D. DNA

E. chlorophyll

63. Plants combine water and carbon dioxide to produce

A. nitrogen and helium

B. glucose and oxygen

C. soil and rocks

D. protein and fat

E. metal and gas

64. Photosynthesis occurs in plant

A. leaves

B. roots only

C. stems only

D. flowers only

E. seeds only

65. The oxygen produced by photosynthesis

A. is waste plants don't use

B. poisons plants

C. has no purpose

D. is required by most life on Earth

E. only helps insects

Passage 14

I found the wallet on the bus—thick with cash and credit cards. Inside was an ID: Marcus Thompson, with an address across town. I could have kept the money. Nobody would know. But I thought about Marcus realizing his wallet was gone, the panic, the hassle of replacing everything. I took the bus to his address. His grateful tears made me understand: doing the right thing isn't about who's watching. It's about who you want to be.

66. The narrator found the wallet

A. at school

B. at home

C. on the bus

D. in a store

E. at the park

67. The wallet contained

A. nothing

B. only an ID

C. only cards

D. books

E. cash and credit cards

68. The narrator could have

A. ignored it

B. kept the money

C. thrown it away

D. destroyed it

E. lost it

69. Instead, the narrator

A. took it to Marcus's address

B. kept it

C. mailed it anonymously

D. gave it to police

E. left it on the bus

70. The passage suggests doing the right thing is about

A. getting rewards

B. being watched

C. becoming famous

D. who you want to be

E. impressing others

Passage 15

The Great Pacific Garbage Patch is a massive collection of marine debris in the North Pacific Ocean. Despite its name, it's not a solid island of trash but rather a diffuse soup of microplastics suspended throughout the water column. Currents concentrate the debris, which harms marine life through ingestion

and entanglement. Cleanup efforts face enormous challenges due to the patch's vast size and the difficulty of removing tiny plastic particles without harming plankton.

71. The Great Pacific Garbage Patch is located in

A. Atlantic Ocean

B. Indian Ocean

C. North Pacific Ocean

D. Arctic Ocean

E. Southern Ocean

72. The patch consists mainly of

A. large intact objects

B. metal

C. glass

D. wood

E. diffuse microplastics

73. Marine life is harmed through

A. loud noises

B. ingestion and entanglement

C. lack of sunlight only

D. cold temperatures

E. disease

74. The patch is created by

A. ocean currents concentrating debris

B. underwater volcanoes

C. fish behavior

D. wind patterns only

E. tides alone

75. Cleanup is difficult because

A. it's too small

B. it's easily accessible

C. plastic floats on top only

D. tiny particles are hard to remove without harming plankton

E. it's made of metal

Passage 16

Coach told me I wasn't starting in the championship game. "Emma deserves it," she said. "She's worked harder in practice." I felt my eyes burn. I was faster, more experienced. But as I watched Emma play—giving everything she had, her face lit with joy I'd forgotten to show—I realized something. Talent matters. But so does heart. And sometimes the person who deserves it most isn't the one with the best stats.

76. The coach decided

A. to cancel the game

B. to let everyone play equally

C. not to start the narrator

D. to forfeit

E. to retire

77. Emma was chosen because

A. she was faster

B. she was older

C. the coach liked her more

D. she complained

E. she'd worked harder in practice

78. The narrator felt

A. happy immediately

B. hurt and frustrated

C. indifferent

D. excited

E. relieved

79. Watching Emma play, the narrator realized

A. talent and heart both matter

B. sports are meaningless

C. Emma was slower

D. coaches are always wrong

E. stats are everything

80. According to the passage, deserving something is about

A. natural talent only

B. being the fastest only

C. having the best stats only

D. both talent and heart/effort

E. complaining the most

Passage 17

Echolocation allows bats and dolphins to "see" using sound. They emit high-frequency clicks and listen for echoes bouncing off objects. The time between emission and echo return, plus echo characteristics, reveals an object's distance, size, shape, and texture. This biological sonar is so precise that bats can detect insects as small as mosquitoes in complete darkness, and dolphins can distinguish between different types of fish.

81. Echolocation allows animals to

A. fly higher

B. swim faster

C. "see" using sound

D. change color

E. breathe underwater

82. Animals using echolocation emit

A. light

B. heat

C. smells

D. colors

E. high-frequency clicks

83. Echo characteristics reveal an object's

A. color only

B. distance, size, shape, and texture

C. age

D. weight only

E. temperature

84. Bats using echolocation can detect insects as small as

A. mosquitoes

B. elephants

C. whales

D. trees

E. mountains

85. Dolphins can use echolocation to

A. fly

B. walk on land

C. change color

D. distinguish between types of fish

E. live without water

Passage 18

The email subject line made my stomach drop: "Scholarship Application—Requires Teacher Recommendation." Deadline: tomorrow. I'd waited too long. My English teacher, Ms. Rodriguez, had already helped three other students this week. Asking felt selfish. But when I finally knocked on her door and explained, she smiled. "That's what I'm here for," she said, staying late to write it. I learned that asking for help isn't weakness—sometimes it's the bravest thing you can do.

86. The scholarship application required

A. test scores only

B. nothing

C. a teacher recommendation

D. money

E. an interview only

87. The deadline was

A. next month

B. next year

C. last week

D. in an hour

E. tomorrow

88. The narrator hesitated to ask because

A. Ms. Rodriguez was mean

B. Ms. Rodriguez had already helped many students

C. they didn't know her

D. it was summer

E. Ms. Rodriguez wasn't available

89. Ms. Rodriguez's response was

A. to smile and stay late to help

B. to refuse

C. to complain

D. to assign more homework

E. to leave immediately

90. The narrator learned that asking for help

A. is always weakness

B. should be avoided

C. is embarrassing

D. isn't needed

E. can be brave

Passage 19

Antibiotic resistance occurs when bacteria evolve to survive drugs designed to kill them. Overuse and misuse of antibiotics accelerates this evolution. When patients don't complete antibiotic courses, they kill susceptible bacteria but leave resistant ones to multiply. Resistant bacteria can spread, making once-treatable infections deadly. Preventing resistance requires using antibiotics only when necessary and always completing prescribed courses.

91. Antibiotic resistance occurs when bacteria

A. die immediately

B. never change

C. evolve to survive antibiotics

D. help patients

E. disappear completely

92. Resistance is accelerated by

A. using antibiotics correctly

B. avoiding all medicine

C. drinking water

D. eating vegetables

E. overuse and misuse of antibiotics

93. Not completing antibiotic courses can

A. cure infections faster

B. leave resistant bacteria to multiply

C. make antibiotics work better

D. prevent all disease

E. have no effect

94. Resistant bacteria make infections

A. easier to treat

B. harmless

C. disappear faster

D. visible

E. harder or impossible to treat

95. To prevent resistance, patients should

A. never use antibiotics

B. share antibiotics

C. stop early when feeling better

D. use antibiotics only when necessary and complete courses

E. double the dosage

Passage 20

My little brother Leo asked why our dad doesn't live with us anymore. He's six. How do you explain divorce to a six-year-old? I said, "Sometimes people love each other but can't live together. It doesn't mean they stop loving you." He thought about it, then asked, "Does Dad still love us?" "Yes," I said, meaning it. "That never changes." He nodded, satisfied. Sometimes being a big sibling means having answers even when you're still figuring things out yourself.

96. Leo wanted to know

A. what's for dinner

B. about homework

C. why their dad doesn't live with them

D. about school

E. about his birthday

97. Leo is

A. sixteen

B. twelve

C. ten

D. eight

E. six years old

98. The narrator explained that sometimes people

A. are perfect

B. love each other but can't live together

C. never have problems

D. should avoid talking

E. don't care

99. Leo's main concern was whether

A. his dad still loved them

B. he'd change schools

C. dinner was ready

D. he could play games

E. he had homework

100. The passage suggests being a big sibling sometimes means

A. knowing everything

B. being perfect

C. avoiding tough questions

D. having answers while still figuring things out yourself

E. never talking

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. VIBRANT:

A. dull

B. lively

C. quiet

D. sad

E. slow

2. CRUCIAL:

A. optional

B. trivial

C. minor

D. essential

E. unnecessary

3. TRANQUIL:

A. peaceful

B. noisy

C. chaotic

D. busy

E. loud

4. ELOQUENT:

A. silent

B. inarticulate

C. articulate

D. confused

E. hesitant

5. MUNDANE:

A. exciting

B. thrilling

C. magical

D. unique

E. ordinary

6. ROBUST:

A. weak

B. strong

C. frail

D. delicate

E. fragile

7. NOVEL:

A. old

B. traditional

C. ancient

D. new

E. familiar

8. CONTEMPLATE:

A. consider

B. ignore

C. dismiss

D. reject

E. avoid

9. FERVENT:

A. cold

B. indifferent

C. passionate

D. apathetic

E. uncaring

10. AMBIGUOUS:

A. clear

B. obvious

C. definite

D. certain

E. vague

11. SERENE:

A. agitated

B. calm

C. worried

D. anxious

E. troubled

12. CONSPICUOUS:

A. hidden

B. concealed

C. invisible

D. obvious

E. obscure

13. TRIVIAL:

A. unimportant

B. significant

C. major

D. crucial

E. vital

14. BENEVOLENT:

A. mean

B. cruel

C. kind

D. harsh

E. hostile

15. DORMANT:

A. active

B. energetic

C. lively

D. busy

E. inactive

16. ARID:

A. wet

B. dry

C. humid

D. moist

E. damp

17. TEDIOUS:

A. exciting

B. thrilling

C. interesting

D. boring

E. engaging

18. FRUGAL:

A. economical

B. wasteful

C. extravagant

D. lavish

E. generous

19. PRISTINE:

A. dirty

B. soiled

C. pure

D. polluted

E. stained

20. OMINOUS:

A. promising

B. hopeful

C. encouraging

D. positive

E. threatening

21. AUDACIOUS:

A. timid

B. bold

C. fearful

D. shy

E. hesitant

22. MEAGER:

A. abundant

B. plentiful

C. generous

D. scanty

E. ample

23. CANDID:

A. frank

B. deceptive

C. dishonest

D. secretive

E. evasive

24. WHIMSICAL:

A. serious

B. stern

C. playful

D. grave

E. solemn

25. OBSOLETE:

A. modern

B. current

C. new

D. contemporary

E. outdated

26. VALIANT:

A. cowardly

B. brave

C. fearful

D. timid

E. weak

27. SUBTLE:

A. obvious

B. blatant

C. clear

D. delicate

E. apparent

28. EMPATHY:

A. understanding

B. indifference

C. apathy

D. cruelty

E. harshness

29. ZEALOUS:

A. lazy

B. apathetic

C. enthusiastic

D. indifferent

E. bored

30. STRINGENT:

A. lenient

B. relaxed

C. loose

D. permissive

E. strict

31. INNATE:

A. learned

B. inborn

C. acquired

D. taught

E. developed

32. LUCRATIVE:

A. unprofitable

B. losing

C. costly

D. profitable

E. expensive

33. ERRATIC:

A. unpredictable

B. consistent

C. steady

D. regular

E. stable

34. PLACID:

A. stormy

B. turbulent

C. tranquil

D. agitated

E. violent

35. DESOLATE:

A. crowded

B. populated

C. busy

D. thriving

E. barren

36. AMPLE:

A. insufficient

B. plentiful

C. scarce

D. limited

E. meager

37. CONCISE:

A. wordy

B. lengthy

C. verbose

D. brief

E. rambling

38. DILIGENT:

A. hardworking

B. lazy

C. careless

D. negligent

E. idle

39. FUTILE:

A. successful

B. productive

C. useless

D. effective

E. worthwhile

40. GREGARIOUS:

A. shy

B. withdrawn

C. reserved

D. antisocial

E. sociable

41. VOLATILE:

A. stable

B. unpredictable

C. steady

D. constant

E. reliable

42. CORDIAL:

A. hostile

B. unfriendly

C. cold

D. warm

E. icy

43. IMMINENT:

A. impending

B. distant

C. remote

D. far

E. unlikely

44. FRIVOLOUS:

A. serious

B. important

C. silly

D. grave

E. significant

45. METICULOUS:

A. careless

B. sloppy

C. negligent

D. reckless

E. careful

46. VERBOSE:

A. silent

B. wordy

C. concise

D. brief

E. terse

47. TENACIOUS:

A. weak

B. yielding

C. flexible

D. persistent

E. giving

48. PROFICIENT:

A. skilled

B. incompetent

C. inexperienced

D. amateur

E. novice

49. SOMBER:

A. cheerful

B. bright

C. serious

D. happy

E. joyful

50. EXEMPLARY:

A. poor

B. mediocre

C. average

D. inferior

E. outstanding

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. Pen is to write as

A. book is to read

B. chair is to sit

C. table is to eat

D. brush is to paint

E. glass is to drink

52. Hot is to cold as

A. tall is to short

B. wet is to dry

C. fast is to quick

D. big is to large

E. happy is to glad

53. Doctor is to hospital as

A. student is to library

B. farmer is to field

C. pilot is to airport

D. chef is to kitchen

E. teacher is to school

54. Leaf is to tree as

A. petal is to flower

B. root is to ground

C. branch is to trunk

D. fruit is to seed

E. bark is to wood

55. Happy is to joyful as

A. angry is to calm

B. tired is to energetic

C. sad is to sorrowful

D. hungry is to full

E. hot is to cold

56. Bird is to nest as

A. fish is to water

B. dog is to house

C. cat is to tree

D. bee is to hive

E. horse is to stable

57. Chapter is to book as

A. page is to paragraph

B. verse is to poem

C. word is to sentence

D. letter is to word

E. title is to story

58. Hammer is to nail as

A. pencil is to paper

B. brush is to paint

C. knife is to cut

D. fork is to eat

E. screwdriver is to screw

59. Winter is to cold as

A. summer is to hot

B. spring is to fall

C. autumn is to warm

D. season is to year

E. month is to week

60. Steering wheel is to car as

A. pedal is to bicycle

B. engine is to train

C. rudder is to ship

D. wing is to airplane

E. wheel is to bus

61. Author is to novel as

A. painter is to gallery

B. sculptor is to museum

C. actor is to theater

D. composer is to symphony

E. director is to studio

62. Seed is to plant as

A. egg is to bird

B. egg is to chicken

C. caterpillar is to butterfly

D. tadpole is to frog

E. larva is to insect

63. Library is to books as

A. school is to students

B. hospital is to doctors

C. store is to customers

D. museum is to visitors

E. aquarium is to fish

64. Smile is to happiness as

A. frown is to sadness

B. laugh is to joke

C. cry is to tears

D. yawn is to tired

E. wink is to eye

65. Thermometer is to temperature as

A. telescope is to stars

B. microscope is to germs

C. speedometer is to speed

D. barometer is to weather

E. compass is to direction

66. Crown is to king as

A. ring is to finger

B. necklace is to neck

C. bracelet is to wrist

D. tiara is to queen

E. watch is to time

67. Drought is to rain as

A. flood is to water

B. famine is to food

C. storm is to wind

D. earthquake is to ground

E. fire is to heat

68. Architect is to building as

A. teacher is to student

B. doctor is to patient

C. farmer is to crop

D. chef is to meal

E. engineer is to bridge

69. Bud is to flower as

A. acorn is to oak

B. petal is to rose

C. seed is to fruit

D. stem is to leaf

E. root is to soil

70. Lens is to camera as

A. film is to movie

B. screen is to television

C. windshield is to car

D. mirror is to reflection

E. glass is to window

71. Chorus is to song as

A. verse is to poetry

B. chapter is to novel

C. scene is to play

D. refrain is to music

E. stanza is to poem

72. Tadpole is to frog as

A. kitten is to cat

B. caterpillar is to butterfly

C. puppy is to dog

D. calf is to cow

E. chick is to chicken

73. Bark is to dog as

A. chirp is to cricket

B. roar is to lion

C. hiss is to snake

D. meow is to cat

E. neigh is to horse

74. Oasis is to desert as

A. island is to ocean

B. mountain is to valley

C. river is to forest

D. lake is to land

E. pond is to garden

75. Graduation is to student as

A. wedding is to couple

B. birthday is to child

C. retirement is to worker

D. anniversary is to marriage

E. promotion is to employee

76. Stethoscope is to doctor as

A. hammer is to builder

B. microscope is to biologist

C. telescope is to astronomer

D. gavel is to judge

E. easel is to painter

77. Prologue is to epilogue as

A. introduction is to conclusion

B. beginning is to end

C. start is to finish

D. opening is to closing

E. preface is to appendix

78. Recipe is to cookbook as

A. map is to atlas

B. song is to album

C. chapter is to book

D. poem is to anthology

E. formula is to textbook

79. Rehearse is to performance as

A. practice is to game

B. study is to learn

C. train is to teach

D. prepare is to ready

E. review is to test

80. Sculptor is to clay as

A. painter is to canvas

B. writer is to pen

C. potter is to clay

D. musician is to instrument

E. dancer is to stage

81. Constellation is to stars as

A. fleet is to ships

B. bouquet is to flowers

C. school is to fish

D. archipelago is to islands

E. forest is to trees

82. Blizzard is to snow as

A. rain is to cloud

B. hurricane is to wind

C. fog is to mist

D. thunder is to lightning

E. hail is to ice

83. Orchestra is to musicians as

A. team is to players

B. class is to students

C. crew is to sailors

D. cast is to actors

E. choir is to singers

84. Palette is to colors as

A. keyboard is to notes

B. canvas is to paint

C. easel is to picture

D. brush is to stroke

E. frame is to art

85. Cocoon is to butterfly as

A. shell is to turtle

B. nest is to bird

C. chrysalis is to moth

D. burrow is to rabbit

E. hive is to bee

86. Telescope is to distant as

A. binoculars is to near

B. glasses is to clear

C. magnifying glass is to large

D. microscope is to tiny

E. camera is to photo

87. Drought is to dry as

A. rain is to wet

B. flood is to wet

C. snow is to cold

D. wind is to breezy

E. sun is to hot

88. Gallery is to art as

A. library is to books

B. museum is to history

C. theater is to plays

D. stadium is to sports

E. conservatory is to music

89. Whisper is to shout as

A. trickle is to pour

B. walk is to run

C. speak is to talk

D. murmur is to say

E. talk is to speak

90. Thermometer is to fever as

A. scale is to weight

B. ruler is to length

C. speedometer is to speeding

D. clock is to time

E. compass is to direction

91. Import is to export as

A. buy is to sell

B. purchase is to buy

C. trade is to exchange

D. receive is to send

E. take is to get

92. Optometrist is to eyes as

A. cardiologist is to heart

B. dentist is to teeth

C. dermatologist is to skin

D. pediatrician is to children

E. neurologist is to brain

93. Anchor is to ship as

A. brake is to car

B. rudder is to boat

C. wheel is to bus

D. propeller is to plane

E. roots is to tree

94. Yolk is to egg as

A. pit is to peach

B. shell is to nut

C. peel is to orange

D. core is to apple

E. rind is to watermelon

95. Sonnet is to poem as

A. novel is to book

B. short story is to fiction

C. haiku is to poetry

D. essay is to writing

E. biography is to nonfiction

96. Evaporate is to liquid as

A. freeze is to water

B. melt is to ice

C. boil is to steam

D. condense is to gas

E. solidify is to solid

97. Applause is to approval as

A. cheer is to excitement

B. boo is to disapproval

C. laugh is to humor

D. cry is to sadness

E. gasp is to surprise

98. Compass is to direction as

A. map is to location

B. watch is to time

C. thermometer is to temperature

D. ruler is to length

E. calendar is to date

99. Preamble is to constitution as

A. introduction is to essay

B. title is to book

C. heading is to chapter

D. caption is to picture

E. label is to product

100. Apprentice is to master as

A. student is to teacher

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 672 ÷ 48?

A. 12

B. 13

C. 15

D. 16

E. 14

2. If 4x + 23 = 91, then x =

A. 114

B. 68

C. 17

D. 4

E. 22

3. What is the least common multiple (LCM) of 24 and 36?

A. 72

B. 12

C. 144

D. 36

E. 48

4. Evaluate: 18 + 24 ÷ 4 − 7

A. 4.5

B. 17

C. 11

D. 21

E. 3.5

5. What is $7^2 - 5^2$?

A. 4

B. 2

C. 74

D. 24

E. 12

6. If m + 103 = 241, then m =

A. 344

B. 103

C. 241

D. 134

E. 138

7. What is the greatest common factor (GCF) of 60 and 84?

A. 4

B. 6

C. 12

D. 20

E. 24

8. Evaluate: $(16 + 12) \times 3 - 20$

A. 64

B. 80

C. 84

D. 44

E. 24

9. Which of the following is a prime number?

A. 51

B. 53

C. 54

D. 55

E. 56

10. What is 2/7 + 3/7?

A. 5/14

B. 6/7

C. 1

D. 5/7

E. 2/7

11. Evaluate: $200 - 18 \times 9 + 12$

A. 1650

B. 1638

C. 38

D. 162

E. 50

12. What is |-37|?

A. 0

B. -37

C. 37

D. 74

E. -74

13. Round 9,573 to the nearest hundred.

A. 9,600

B. 9,500

C. 9,570

D. 10,000

E. 9,580

14. What is $4/9 - 1/9$?

A. 3/9

B. 1/3

C. 4/9

D. 5/9

E. 2/9

15. Evaluate: $8 \times 7 + 5 \times 6$

A. 56

B. 30

C. 91

D. 86

E. 106

16. What is 5^3?

A. 15

B. 25

C. 75

D. 100

E. 125

17. If $b - 89 = 167$, then $b =$

A. 78

B. 89

C. 256

D. 167

E. 178

18. Which number is divisible by both 4 and 6?

A. 48

B. 18

C. 22

D. 26

E. 32

19. What is $3/5 + 1/5$?

A. 3/5

B. 4/5

C. 1

D. 2/5

E. 3/10

20. Evaluate: $150 - 12 \times 10 + 8$

A. 1388

B. 1380

C. 120

D. 38

E. 28

21. What is 3/8 × 2/5?

A. 6/40

B. 5/13

C. 6/13

D. 1/2

E. 3/20

22. Convert 9/25 to a decimal.

A. 0.9

B. 0.09

C. 0.36

D. 0.25

E. 0.92

23. What is 180% of 70?

A. 126

B. 70

C. 90

D. 140

E. 108

24. Simplify: 24/32

A. 12/16

B. 3/4

C. 6/8

D. 2/3

E. 1/2

25. What is 0.8 + 0.67?

A. 0.75

B. 0.88

C. 0.13

D. 1.47

E. 1.50

26. The ratio of cats to dogs is 5:3. If there are 15 cats, how many dogs are there?

A. 5

B. 10

C. 12

D. 18

E. 9

27. What is 35% of 240?

A. 35

B. 240

C. 84

D. 120

E. 70

28. Which is greatest: 3/4, 7/10, or 4/5?

A. 4/5

B. 7/10

C. 3/4

D. They're equal

E. Cannot determine

29. What is 3.6 × 0.5?

A. 18

B. 1.8

C. 0.18

D. 4.1

E. 7.2

30. A store marks up items 75% above cost. If an item costs $80, what is the selling price?

A. $80

B. $155

C. $60

D. $140

E. $100

31. What is 7/12 ÷ 1/3?

A. 7/36

B. 1/4

C. 12/7

D. 3/7

E. 7/4

32. Convert 0.06 to a fraction in simplest form.

A. 6/10

B. 3/5

C. 3/50

D. 6/100

E. 1/6

33. What percent of 90 is 27?

A. 30%

B. 27%

C. 3%

D. 90%

E. 10%

34. What is 2 1/3 + 3 2/5?

A. 5 3/5

B. 5 11/15

C. 5 2/3

D. 6 1/15

E. 5 1/5

35. If 4/7 of a number is 56, what is the number?

A. 32

B. 16

C. 112

D. 98

E. 84

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

A. 4:5

B. 6:8

C. 9:12

D. 12:16

E. 3:4

37. What is 9.4 − 4.85?

A. 5.55

B. 5.45

C. 4.55

D. 4.45

E. 3.55

38. A shirt costs $150 after a 30% discount. What was the original price?

A. approximately $214

B. $180

C. $195

D. $165

E. $200

39. What is 4/9 + 2/9?

A. 6/18

B. 2/3

C. 6/9

D. 1

E. 4/9

40. If x:y = 7:4 and x = 42, what is y?

A. 28

B. 35

C. 21

D. 24

E. 30

41. Solve for a: $3a + 11 = 38$

A. 49

B. 27

C. 3

D. 11

E. 9

42. What is the value of $4p + 3q$ when $p = 5$ and $q = 6$?

A. 26

B. 29

C. 38

D. 45

E. 18

43. If $6n - 9 = 39$, then $n =$

A. 8

B. 30

C. 45

D. 6

E. 5

44. Simplify: $5(y + 4)$

A. $5y + 4$

B. $5y + 20$

C. $y + 20$

D. $5y + 9$

E. 9y

45. What is the value of n^2 when n = 11?

A. 22

B. 11

C. 33

D. 121

E. 110

46. Solve: m/7 = 9

A. 2

B. 16

C. 7

D. 9

E. 63

47. If 4(k + 5) = 32, then k =

A. 13

B. 10

C. 3

D. 8

E. 5

48. What is 3x + 5x?

A. 8x

B. $8x^2$

C. 8

D. 3x

E. 15x

49. Evaluate: $6r - 3r + 10$ when $r = 4$

A. 18

B. 22

C. 14

D. 20

E. 28

50. If $8b = 96$, then $b =$

A. 88

B. 104

C. 8

D. 12

E. 16

51. What is the perimeter of a square with side length 18?

A. 36

B. 324

C. 54

D. 90

E. 72

52. A rectangle has length 22 and width 13. What is its area?

A. 35

B. 70

C. 286

D. 280

E. 300

53. What is the circumference of a circle with radius 9? (Use $\pi \approx 3.14$)

A. 56.52

B. 28.26

C. 18

D. 254.34

E. 45

54. A triangle has base 28 and height 15. What is its area?

A. 43

B. 210

C. 420

D. 86

E. 240

55. What is the volume of a rectangular box with dimensions $6 \times 5 \times 8$?

A. 19

B. 30

C. 48

D. 240

E. 280

56. An equilateral triangle has one side of length 11. What is its perimeter?

A. 22

B. 44

C. 11

D. 55

E. 33

57. What is the area of a circle with radius 12? (Use $\pi \approx 3.14$)

A. 37.68

B. 75.36

C. 452.16

D. 144

E. 753.6

58. A rectangular field is 40 feet long and 25 feet wide. What is its perimeter?

A. 130 feet

B. 1000 feet

C. 65 feet

D. 80 feet

E. 100 feet

59. What is the area of a parallelogram with base 20 and height 11?

A. 31

B. 220

C. 110

D. 62

E. 200

60. A cube has edge length 6. What is its volume?

A. 18

B. 36

C. 108

D. 216

E. 180

61. Emma buys 4 books at $6 each and 3 pencils at $3 each. How much does she spend?

A. $24

B. $9

C. $30

D. $27

E. $33

62. A car travels 280 miles in 5 hours. What is its average speed?

A. 275 mph

B. 285 mph

C. 56 mph

D. 70 mph

E. 50 mph

63. Leo has $92. He spends $28 on a game and $35 on a book. How much does he have left?

A. $29

B. $63

C. $64

D. $155

E. $27

64. A warehouse has 192 boxes. If they pack 16 boxes per crate, how many crates do they need?

A. 176

B. 12

C. 16

D. 192

E. 13

65. Ana swims 6 laps around a pool. If each lap is 500 meters, how far does she swim?

A. 506 meters

B. 83 meters

C. 494 meters

D. 3000 meters

E. 2500 meters

66. A concert starts at 3:30 PM and lasts 2 hours and 45 minutes. What time does it end?

A. 5:75 PM

B. 5:15 PM

C. 6:45 PM

D. 5:45 PM

E. 6:15 PM

67. A novel has 420 pages. Sofia reads 60 pages per day. How many days will it take her to finish?

A. 480 days

B. 360 days

C. 7 days

D. 8 days

E. 6 days

68. The temperature was 8°C in the morning and rose 15°C by afternoon. What was the afternoon temperature?

A. 23°C

B. −7°C

C. 120°C

D. 15°C

E. 20°C

69. A pie is cut into 10 equal slices. If Marcus eats 4 slices, what fraction of the pie remains?

A. 4/10

B. 3/5

C. 1/2

D. 4/5

E. 2/5

70. A rectangular swimming pool is 30 meters long, 12 meters wide, and 3 meters deep. What is its volume?

A. 45 cubic meters

B. 360 cubic meters

C. 90 cubic meters

D. 1080 cubic meters

E. 84 cubic meters

71. What is the average of 18, 26, 22, and 30?

A. 96

B. 26

C. 22

D. 20

E. 24

72. A store sells notebooks for $12 each. If they sell 55 notebooks, how much revenue do they make?

A. $67

B. $43

C. $660

D. $600

E. $720

73. What is the median of the following numbers: 5, 12, 4, 15, 9?

A. 9

B. 12

C. 15

D. 4

E. 5

74. A sequence follows the rule: add 23. If the first term is 29, what is the 7th term?

A. 52

B. 167

C. 144

D. 190

E. 121

75. A rectangular banner is 60 inches long and 45 inches wide. What is the length of its diagonal?

A. 105 inches

B. 15 inches

C. 52.5 inches

D. 75 inches

E. 90 inches

76. What is the probability of rolling a number less than 3 on a standard six-sided die?

A. 1/2

B. 1/6

C. 2/3

D. 1/4

E. 1/3

77. A vehicle travels at 65 mph for 4 hours. How far does it travel?

A. 69 miles

B. 61 miles

C. 260 miles

D. 280 miles

E. 240 miles

78. What is the mode of the following numbers: 7, 10, 7, 14, 7, 11, 10?

A. 7

B. 10

C. 14

D. 11

E. 9

79. A baker makes 168 cookies and packs them in boxes of 14. How many boxes does she need?

A. 154

B. 12

C. 182

D. 168

E. 10

80. What is the range of the following numbers: 22, 30, 14, 35, 24?

A. 22

B. 30

C. 14

D. 21

E. 24

81. A triangle has angles measuring 50° and 70°. What is the measure of the third angle?

A. 120°

B. 180°

C. 50°

D. 70°

E. 60°

82. A ribbon 150 inches long is cut into 5 equal pieces. How long is each piece?

A. 145 inches

B. 750 inches

C. 30 inches

D. 50 inches

E. 25 inches

83. What is the area of a trapezoid with bases 12 and 16, and height 10?

A. 140

B. 38

C. 280

D. 160

E. 100

84. A number is squared, then 20 is subtracted. The result is 60. What is the number?

A. 6

B. approximately 9

C. 40

D. 80

E. 10

85. The perimeter of a rectangle is 66. If the length is 21, what is the width?

A. 45

B. 33

C. 87

D. 12

E. 18

86. What is 25% of 35% of 240?

A. 60

B. 84

C. 15

D. 70

E. 21

87. A bag contains 6 red, 4 blue, and 8 green marbles. What is the probability of selecting a red marble?

A. 6/18

B. 4/18

C. 1/3

D. 8/18

E. 6/12

88. What is the surface area of a cube with edge length 5?

A. 150

B. 125

C. 25

D. 75

E. 100

89. If a pattern continues 5, 15, 45, 135, what is the next number?

A. 180

B. 405

C. 270

D. 540

E. 675

90. A store offers a 20% discount, then an additional 15% discount on the sale price. What is the final price of a $300 item?

A. $240

B. $255

C. $270

D. $204

E. $195

91. Solve for x: $6x - 15 = 4x + 9$

A. 24

B. 6

C. −6

D. 3

E. 12

92. What is the value of $a^2 - b^2$ when $a = 6$ and $b = 4$?

A. 2

B. 52

C. 20

D. 40

E. 36

93. If $3(p - 7) = 24$, then $p =$

A. 15

B. 31

C. 3

D. 8

E. 10

94. Simplify: $10y - 4y + 3y$

A. 3y

B. 9y

C. 17y

D. 10y

E. 6y

95. What is the value of $3m^2$ when $m = 8$?

A. 24

B. 64

C. 48

D. 192

E. 384

96. Solve: $2x/5 = 8$

A. 3.2

B. 10

C. 16

D. 40

E. 20

97. If $5(n + 6) = 45$, then n =

A. 15

B. 51

C. 3

D. 9

E. 6

98. What is $4a - 2a + 7$ when $a = 6$?

A. 19

B. 21

C. 13

D. 17

E. 24

99. If $7c = 91$, then c =

A. 84

B. 13

C. 7

D. 14

E. 98

100. What is the value of $(x + y)^2$ when $x = 5$ and $y = 7$?

A. 12

B. 74

C. 25

D. 144

E. 49

ANSWERS AND EXPLANATIONS

Quantitative

1. A: 14 - Divide 616 by 44: 616 ÷ 44 = 14. This is a division fact from the 44 times table. Check: 44 × 14 = 616 ✓ Knowing multiplication facts helps solve division problems quickly.

2. C: 17 - Solve 3x + 17 = 68 in two steps. Subtract 17 from both sides: 3x = 51. Divide both sides by 3: x = 17. Check: 3(17) + 17 = 51 + 17 = 68 ✓

3. E: 37 - A prime number has exactly two factors: 1 and itself. Check each: 15 = 3 × 5 (not prime), 21 = 3 × 7 (not prime), 27 = 3 × 9 (not prime), 33 = 3 × 11 (not prime), but 37 can only be divided by 1 and 37 (prime). Prime numbers are fundamental building blocks of all numbers.

4. B: 100 - Calculate each exponent, then add. $8^2 = 8 \times 8 = 64$. Then $6^2 = 6 \times 6 = 36$. Finally add: 64 + 36 = 100. When combining squared numbers, calculate each square first.

5. D: 245 - Solve n − 97 = 148 by adding 97 to both sides: n = 148 + 97 = 245. Check: 245 − 97 = 148 ✓ To undo subtraction, use addition.

6. A: 24 - The GCF is the largest number that divides both evenly. Factors of 48: 1, 2, 3, 4, 6, 8, 12, 16, 24, 48. Factors of 72: 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72. The greatest common factor is 24. Check: 48 ÷ 24 = 2 ✓ and 72 ÷ 24 = 3 ✓

7. C: 17 - Follow order of operations (PEMDAS). Divide first: 18 ÷ 3 = 6. Then work left to right: 15 + 6 = 21, then 21 − 4 = 17. Division must be done before addition and subtraction.

8. E: 3/8 - Convert 0.375 to a fraction: 0.375 = 375/1000. Simplify by dividing both by 125: 375 ÷ 125 = 3 and 1000 ÷ 125 = 8, giving 3/8. Check: 3 ÷ 8 = 0.375 ✓

9. B: 21 - To find 25% of 84, multiply: 0.25 × 84 = 21. Mental math: 25% is the same as 1/4, and 84 ÷ 4 = 21. Quarter percentages are easy to calculate this way.

10. D: 17 - Solve 5y = 85 by dividing both sides by 5: y = 85 ÷ 5 = 17. Check: 5 × 17 = 85 ✓ Division is the inverse of multiplication.

11. A: 23 - The absolute value of a number is its distance from zero, always positive. |-23| = 23 because -23 is 23 units away from 0 on the number line. Absolute value removes the negative sign.

12. A: 7,800 - When rounding to the nearest hundred, look at the tens digit. In 7,849, the tens digit is 4. Since 4 < 5, round down: the hundreds digit stays 8, making 7,800.

13. E: 4/5 - When adding fractions with the same denominator, keep the denominator and add numerators: 3/5 + 1/5 = (3 + 1)/5 = 4/5. The denominator stays 5; only add the numerators.

14. B: 25 - Follow order of operations. Parentheses first: 12 + 8 = 20. Then multiply: 20 × 2 = 40. Finally subtract: 40 − 15 = 25. Parentheses are always calculated first.

15. D: 64 - Calculate the exponent: $4^3 = 4 \times 4 \times 4 = 16 \times 4 = 64$. An exponent indicates how many times to multiply the base by itself. 4 cubed means 4 multiplied by itself three times.

16. A: 77 - Solve a + 42 = 119 by subtracting 42 from both sides: a = 119 − 42 = 77. Check: 77 + 42 = 119 ✓ To undo addition, use subtraction.

17. C: 75 - Follow order of operations. Multiply first: 7 × 9 = 63 and 3 × 4 = 12. Then add: 63 + 12 = 75. Both multiplications must be completed before addition.

18. E: 36 - A number divisible by both 3 and 4 must be divisible by 12 (the LCM of 3 and 4). Check the options: 18 ÷ 12 = 1.5 (no), 20 ÷ 12 = 1.67... (no), 22 ÷ 12 = 1.83... (no), 26 ÷ 12 = 2.17... (no), 36 ÷ 12 = 3 ✓. Also verify: 36 ÷ 3 = 12 ✓ and 36 ÷ 4 = 9 ✓

19. B: 2/3 - When subtracting fractions with the same denominator, keep the denominator and subtract numerators: 5/6 − 1/6 = (5 − 1)/6 = 4/6. Simplify by dividing both by 2: 4/6 = 2/3. Always simplify fractions to lowest terms.

20. D: 15 - Follow order of operations. Multiply first: 15 × 6 = 90. Then work left to right: 100 − 90 = 10, then 10 + 5 = 15. Multiplication must be done before addition and subtraction.

21. A: 3/10 - When multiplying fractions, multiply numerators together and denominators together: (3 × 2)/(4 × 5) = 6/20. Simplify by dividing both by 2: 6/20 = 3/10. Always simplify after multiplying fractions.

22. C: 0.35 - To convert a fraction to decimal, divide numerator by denominator: 7 ÷ 20 = 0.35. Check by converting back: 0.35 = 35/100 = 7/20 ✓ (after simplifying by 5).

23. E: 90 - To find 150% of 60, multiply: 1.50 × 60 = 90. Percentages over 100% result in values larger than the original number. 150% means "one and a half times" the original.

24. B: 3/4 - Simplify 18/24 by finding the GCF of 18 and 24, which is 6. Divide both numerator and denominator by 6: 18 ÷ 6 = 3 and 24 ÷ 6 = 4, giving 3/4. Check: 3/4 = 0.75 and 18/24 = 0.75 ✓

25. D: 1.05 - Line up the decimal points and add: 0.60 + 0.45 = 1.05. When adding decimals, ensure decimal points are aligned vertically for accurate calculation.

26. A: 16 - The ratio 3:4 means for every 3 boys, there are 4 girls. If there are 12 boys, find how many groups of 3: 12 ÷ 3 = 4 groups. Each group has 4 girls, so total girls = 4 × 4 = 16. Or use proportion: 3/4 = 12/x, cross multiply: 3x = 48, so x = 16.

27. C: 70 - To find 40% of 175, multiply: 0.40 × 175 = 70. Mental math: 10% of 175 is 17.5, so 40% is 4 × 17.5 = 70. Breaking percentages into 10% chunks makes calculation easier.

28. E: 3/4 - Convert to common denominator to compare. Using 24ths: 2/3 = 16/24, 5/8 = 15/24, 3/4 = 18/24. Since 18/24 is largest, 3/4 is greatest. Or convert to decimals: 2/3 ≈ 0.667, 5/8 = 0.625, 3/4 = 0.75. Clearly 0.75 is largest.

29. B: 1 - Multiply decimals: 2.5 × 0.4 = 1.0 = 1. Count decimal places: 2.5 has 1 decimal place, 0.4 has 1 decimal place, so the product should have 2 decimal places. 25 × 4 = 100, so 2.5 × 0.4 = 1.00 = 1.

30. D: $80 - A 60% markup means the selling price is 160% of cost. Calculate: 1.60 × $50 = $80. Or find markup amount: 0.60 × $50 = $30, then add: $50 + $30 = $80. Markup percentages add to the original cost.

31. A: 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. C: 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. E: 25% - Set up the equation: (x/100) × 80 = 20. Solve: 80x = 2000, so x = 25. Therefore 20 is 25% of 80. Or think: 20 is 1/4 of 80, and 1/4 = 25%.

34. B: 4 1/4 - Convert to improper fractions: 1 1/2 = 3/2 and 2 3/4 = 11/4. Find common denominator (4): 3/2 = 6/4. Add: 6/4 + 11/4 = 17/4. Convert back to mixed number: 17 ÷ 4 = 4 remainder 1, so 4 1/4.

35. D: 75 - If 3/5 of a number equals 45, set up equation: (3/5)n = 45. Multiply both sides by 5/3: n = 45 × (5/3) = 225/3 = 75. Check: (3/5) × 75 = 225/5 = 45 ✓

36. A: 2:3 - Simplify the ratio 24:36 by dividing both numbers by their GCF, which is 12. 24 ÷ 12 = 2 and 36 ÷ 12 = 3, giving 2:3. Check: 2 × 12 = 24 and 3 × 12 = 36 ✓

37. C: 4.75 - Align decimal points and subtract: 8.70 − 3.95 = 4.75. When subtracting, you may need to rewrite 8.7 as 8.70 to align decimal places properly. Borrowing works the same as with whole numbers.

38. E: $160 - If $120 is the price after a 25% discount, it represents 75% of the original price. Set up equation: 0.75x = 120. Solve: x = 120 ÷ 0.75 = 160. Check: 0.75 × $160 = $120 ✓ Working backwards from a discount requires dividing by the remaining percentage.

39. B: 5/7 - When adding fractions with the same denominator, keep the denominator and add numerators: 3/7 + 2/7 = (3 + 2)/7 = 5/7. The denominator stays 7; only add the numerators.

40. D: 48 - If x:y = 5:8 and x = 30, set up proportion: 5/8 = 30/y. Cross multiply: 5y = 240. Divide: y = 48. Check the ratio: 30:48 = 5:8 ✓ (after dividing both by 6).

41. A: 11 - Solve $2x + 9 = 31$ in two steps. Subtract 9 from both sides: $2x = 22$. Divide both sides by 2: $x = 11$. Check: $2(11) + 9 = 22 + 9 = 31$ ✓

42. C: 22 - Substitute values: $3a + 2b = 3(4) + 2(5) = 12 + 10 = 22$. Always perform multiplication before addition when evaluating expressions.

43. E: 7 - Solve $5m - 7 = 28$ in two steps. Add 7 to both sides: $5m = 35$. Divide both sides by 5: $m = 7$. Check: $5(7) - 7 = 35 - 7 = 28$ ✓

44. B: 4x + 12 - Distribute the 4 to both terms inside the parentheses: $4(x + 3) = 4 \cdot x + 4 \cdot 3 = 4x + 12$. Distribution means multiplying each term inside by the number outside.

45. D: 81 - Calculate the exponent: $y^2 = 9^2 = 9 \times 9 = 81$. Squaring a number means multiplying it by itself.

46. A: 42 - Solve $x/6 = 7$ by multiplying both sides by 6: $x = 7 \times 6 = 42$. Check: $42 \div 6 = 7$ ✓ Multiplication undoes division.

47. A: 5 - Solve $3(n + 4) = 27$ by first dividing both sides by 3: $n + 4 = 9$. Then subtract 4: $n = 5$.

48. E: 5x - Combine like terms: $2x + 3x = (2 + 3)x = 5x$. When adding terms with the same variable, add the coefficients and keep the variable.

49. B: 17 - First substitute $p = 3$: $5p - 2p + 8 = 5(3) - 2(3) + 8$. Then calculate: $15 - 6 + 8 = 17$. Combine like terms first if possible: $(5p - 2p) + 8 = 3p + 8 = 3(3) + 8 = 9 + 8 = 17$.

50. D: 12 - Solve $7a = 84$ by dividing both sides by 7: $a = 84 \div 7 = 12$. Check: $7 \times 12 = 84$ ✓ Division is the inverse of multiplication.

51. A: 7b - Combine like terms: $6b + 4b - 3b = (6 + 4 - 3)b = 7b$. When combining like terms, add and subtract the coefficients.

52. C: 15 - Substitute $x = 10$: $2x - 5 = 2(10) - 5 = 20 - 5 = 15$. Always perform multiplication before subtraction when evaluating expressions.

53. E: 56 - Solve $y/8 + 3 = 10$ in two steps. Subtract 3 from both sides: $y/8 = 7$. Multiply both sides by 8: $y = 56$. Check: $56 \div 8 + 3 = 7 + 3 = 10$ ✓

54. B: 7 - Solve $4(x - 2) = 20$ by dividing both sides by 4 first: $x - 2 = 5$. Then add 2 to both sides: $x = 7$. Check: $4(7 - 2) = 4(5) = 20$ ✓

55. D: $6n^2$ - When multiplying terms with the same variable, multiply the coefficients and add the exponents: $3n \times 2n = (3 \times 2)(n^1 \times n^1) = 6n^2$. The exponents add: $n^{1+1} = n^2$.

56. A: 12 - Substitute values: $(x + y)/2 = (14 + 10)/2 = 24/2 = 12$. This formula calculates the average (mean) of two numbers.

57. C: 10 - Solve $5x - 12 = 3x + 8$ by getting variables on one side. Subtract 3x from both sides: $2x - 12 = 8$. Add 12 to both sides: $2x = 20$. Divide by 2: $x = 10$. Check: $5(10) - 12 = 50 - 12 = 38$ and $3(10) + 8 = 30 + 8 = 38$ ✓

58. E: 25 - Substitute values: $a^2 + b^2 = 3^2 + 4^2 = 9 + 16 = 25$. This is actually the Pythagorean theorem relationship for a 3-4-5 right triangle.

59. B: 6 - Solve $2(p + 5) = 22$ by dividing both sides by 2 first: $p + 5 = 11$. Then subtract 5 from both sides: $p = 6$. Check: $2(6 + 5) = 2(11) = 22$ ✓

60. D: 7x - Combine like terms: $8x - 3x + 2x = (8 - 3 + 2)x = 7x$. Work left to right: $8x - 3x = 5x$, then $5x + 2x = 7x$.

61. A: 60 - Perimeter of a square = 4 × side length = 4 × 15 = 60. All four sides of a square are equal, so multiply one side by 4.

62. C: 198 - Area of rectangle = length × width = 18 × 11 = 198 square units. Don't confuse with perimeter, which would be $2(18 + 11) = 58$.

63. E: 43.96 - Circumference = $2\pi r = 2 \times 3.14 \times 7 = 43.96$. The formula uses radius, not diameter. Circumference is the distance around a circle.

64. B: 156 - Area of triangle = (base × height) ÷ 2 = (24 × 13) ÷ 2 = 312 ÷ 2 = 156 square units. A triangle's area is always half that of a rectangle with the same base and height.

65. D: 120 - Volume of rectangular box = length × width × height = 5 × 4 × 6 = 120 cubic units. Volume measures the space inside a three-dimensional object.

66. A: 27 - An equilateral triangle has all three sides equal. If one side is 9, perimeter = 3 × 9 = 27. Equilateral means "equal-sided."

67. C: 314 - Area of circle = $\pi r^2 = 3.14 \times 10^2 = 3.14 \times 100 = 314$ square units. Don't confuse area (πr^2) with circumference ($2\pi r$).

68. E: 100 feet - Perimeter of rectangle = 2(length + width) = 2(30 + 20) = 2(50) = 100 feet. Walking around the perimeter means covering all four sides.

69. B: 144 - Area of parallelogram = base × height = 16 × 9 = 144 square units. Like a rectangle, multiply base times height, not times the slanted side.

70. D: 125 - Volume of cube = $\text{edge}^3 = 5^3 = 5 \times 5 \times 5 = 125$ cubic units. A cube has all edges equal, so volume is side cubed.

71. A: $16 - Calculate notebooks: 3 × $4 = $12. Calculate pens: 2 × $2 = $4. Total: $12 + $4 = $16. Break multi-step problems into simpler calculations.

72. C: 60 mph - Average speed = distance ÷ time = 240 miles ÷ 4 hours = 60 mph. Speed tells how far you travel per unit of time.

73. E: $31 - Calculate total spent: $23 + $31 = $54. Subtract from original amount: $85 − $54 = $31 remaining. Work through money problems step by step.

74. B: 13 - Divide total apples by apples per basket: 156 ÷ 12 = 13 baskets. Check: 13 × 12 = 156 ✓ Division helps distribute items into equal groups.

75. D: 2000 meters - Total distance = laps × meters per lap = 5 × 400 = 2000 meters. Multiplication finds total when you have equal groups.

76. A: 5:15 PM - From 2:45 PM, add 2 hours 30 minutes. Add 2 hours: 2:45 + 2:00 = 4:45. Add 30 minutes: 4:45 + 0:30 = 5:15 PM. Break time calculations into hours and minutes separately.

77. C: 8 days - Divide total pages by pages per day: 360 ÷ 45 = 8 days. Check: 8 × 45 = 360 ✓ Division finds how many equal groups fit into a total.

78. E: 17°C - Add the temperature increase: 5°C + 12°C = 17°C. Temperature increase means addition, while temperature decrease means subtraction.

79. B: 5/8 - If Josh eats 3 out of 8 slices, remaining = 8 − 3 = 5 slices out of 8 total = 5/8. Subtraction finds what remains.

80. D: 500 cubic meters - Volume = length × width × depth = 25 × 10 × 2 = 500 cubic meters. Volume requires all three dimensions multiplied together.

81. A: 21 - Average = sum ÷ count. Sum: 15 + 23 + 18 + 28 = 84. Count: 4 numbers. Average: 84 ÷ 4 = 21. The average (mean) is the sum divided by how many numbers.

82. C: $810 - Revenue = price × quantity = $18 × 45 = $810. Multiplication finds total revenue from unit price and quantity sold.

83. E: 7 - To find median, arrange in order: 3, 4, 7, 9, 11. The middle value (third out of five) is 7. The median is the middle value when numbers are arranged in order.

84. B: 118 - The sequence adds 19 each time. 1st: 23. 2nd: 23 + 19 = 42. 3rd: 42 + 19 = 61. 4th: 61 + 19 = 80. 5th: 80 + 19 = 99. 6th: 99 + 19 = 118. Count carefully through arithmetic sequences.

85. D: 60 inches - Use Pythagorean theorem: $a^2 + b^2 = c^2$. Here: $48^2 + 36^2 = c^2$. Calculate: 2304 + 1296 = 3600. Therefore $c^2 = 3600$, so c = 60 inches. This is a multiple of the 3-4-5 right triangle (multiplied by 12).

86. A: 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.

87. C: 165 miles - Distance = speed × time = 55 mph × 3 hours = 165 miles. Multiply rate by time to find total distance traveled.

88. E: 5 - The mode is the number that appears most frequently. Count: 5 appears 3 times, 8 appears 2 times, 12 appears 1 time, 9 appears 1 time. Mode = 5. The mode is the most common value.

89. B: 12 - Divide total cupcakes by cupcakes per box: 144 ÷ 12 = 12 boxes. Check: 12 × 12 = 144 ✓ Division helps organize items into equal containers.

90. D: 19 - Range = highest value − lowest value. Highest: 30. Lowest: 11. Range: 30 − 11 = 19. The range shows the spread of data.

91. A: 70° - Sum of angles in a triangle = 180°. Given angles: 45° + 65° = 110°. Third angle: 180° − 110° = 70°. All triangle angles always sum to exactly 180°.

92. C: 40 inches - Divide total rope by number of pieces: 120 ÷ 3 = 40 inches per piece. Check: 3 × 40 = 120 ✓ Division creates equal parts.

93. E: 96 - Area of trapezoid = $(b_1 + b_2) \times h \div 2 = (10 + 14) \times 8 \div 2 = 24 \times 8 \div 2 = 192 \div 2 = 96$ square units. The trapezoid formula averages the two bases, then multiplies by height.

94. B: 8 - Work backwards. If result is 49 after subtracting 15, then before subtracting: 49 + 15 = 64. If squaring gave 64, the number is $\sqrt{64} = 8$. Check: $8^2 - 15 = 64 - 15 = 49$ ✓

95. D: 9 - Perimeter of rectangle = 2(length + width) = 54. So length + width = 27. If length = 18, then width = 27 − 18 = 9. Check: 2(18 + 9) = 2(27) = 54 ✓

96. A: 24 - Calculate step by step. 40% of 200 = 0.40 × 200 = 80. Then 30% of 80 = 0.30 × 80 = 24. Or combine: 0.30 × 0.40 × 200 = 0.12 × 200 = 24.

97. C: 1/5 - Total marbles: 5 + 3 + 7 = 15. Blue marbles: 3. Probability = 3/15 = 1/5 (after simplifying by 3). Count specific outcomes over total possible outcomes.

98. E: 96 - Surface area of cube = $6s^2 = 6 \times 4^2 = 6 \times 16 = 96$ square units. A cube has 6 faces, each with area s^2.

99. B: 243 - Examine pattern: each number is multiplied by 3. 3 × 3 = 9, 9 × 3 = 27, 27 × 3 = 81, 81 × 3 = 243. This is a geometric sequence with ratio 3.

100. D: $153 - First discount: $200 × 0.85 = $170 (after 15% off). Second discount: $170 × 0.90 = $153 (after additional 10% off the sale price). Sequential discounts multiply: 0.85 × 0.90 = 0.765, so final price is 76.5% of original.

Reading

1. C: no individual completes the entire round trip - The passage explicitly states: "No single butterfly completes the round trip—it takes four to five generations." This unique characteristic makes the monarch migration extraordinary—each butterfly participates in only a portion of the journey.

2. E: living much longer than normal - The passage explains that "super generation" butterflies "live eight months instead of the usual six weeks." This extended lifespan is what enables them to make the long southward journey.

3. E: conserve energy by not reproducing - The passage notes that during migration, super generation butterflies do not reproduce, "allowing them to make the journey south without reproducing." This energy conservation is critical for completing the 3,000-mile journey.

4. A: four to five - The passage directly states: "it takes four to five generations" to complete the full migration cycle. This multigenerational journey is part of what makes monarch migration so remarkable.

5. D: Mexico - The passage indicates monarchs "travel up to 3,000 miles from North America to Mexico each fall." Mexico's oyamel fir forests serve as their winter sanctuary.

6. C: cinnamon - The opening sentence establishes: "My grandmother's kitchen always smelled like cinnamon and stories." This sensory detail sets the warm, comforting tone of the passage.

7. E: didn't understand grandmother's emotions - The passage states: "I was twelve and didn't understand why that would make someone cry." At that age, the narrator couldn't comprehend the emotional connection between food and memory.

8. B: written recipes don't capture technique - The narrator explains: "I had to call her three times because written instructions don't capture the 'feel' of properly kneaded bulgur or the 'sound' of meat mixed to the right consistency." Cooking techniques require experiential knowledge beyond written words.

9. A: understood her grandmother's feelings about food - The passage reveals: "Now at twenty-seven, living far from family, I finally get it... I understood. Food isn't just food. It's memory, connection, and belonging." Distance and maturity brought understanding.

10. D: memory and connection - The narrator concludes: "food isn't just food—it's memory and connection." This realization transforms her understanding of why her grandmother cried while cooking family recipes in a foreign country.

11. C: tissue repair and immunity - The passage states: "Deep sleep repairs tissues and strengthens immunity." These physical restoration processes occur during the deepest sleep stage.

12. E: vivid dreams and memory consolidation - The passage explains: "REM sleep, when vivid dreams occur, helps process emotions and consolidate memories." REM sleep is characterized by high brain activity and dreaming.

13. B: 7-9 hours - The passage directly states: "Adults need 7-9 hours nightly." This is the recommended sleep duration for optimal health and cognitive function.

14. A: decision-making, emotions, and immunity - The passage notes: "Chronic sleep deprivation impairs decision-making, weakens emotional control, and compromises immune function." Sleep loss affects multiple body systems.

15. D: becomes highly active - While the passage describes REM sleep when "vivid dreams occur" and notes memory consolidation happens, it indicates the brain becomes highly active during REM sleep, even though the body is paralyzed.

16. C: North Carolina - The passage states: "Venus flytraps are carnivorous plants native to North Carolina bogs." This specific geographic origin is important to their ecology.

17. E: twice within twenty seconds - The passage explains: "Their hinged leaves snap shut in less than a second when trigger hairs are touched twice within twenty seconds." This timing mechanism prevents false triggers.

18. B: wasting energy on non-food items - The passage notes: "this prevents wasting energy on rain or debris." The two-touch requirement is an evolutionary adaptation that conserves the plant's resources by ensuring the stimulus is likely prey, not just environmental factors.

19. E: 5-12 days - The passage states: "The trapped insect is digested over 5-12 days." This relatively long digestion period extracts maximum nutrients from prey.

20. D: nitrogen from nutrient-poor soil - The passage explains: "providing nitrogen the plant can't get from nutrient-poor soil." The bog environment lacks sufficient nitrogen, so Venus flytraps supplement through carnivory.

21. C: a telescope - The opening sentence states: "I didn't mean to break Mr. Chen's telescope." This establishes the central incident of the passage.

22. E: adjusting the focus - The narrator explains: "I was adjusting the focus for the astronomy club presentation when it slipped." The accident occurred during preparation for a presentation.

23. B: left a confession note - The passage states: "Instead of hiding it, I left a note confessing and offered to pay from my savings." This honest response is the key to the passage's moral lesson.

24. A: pay from savings - The narrator "offered to pay from my savings," demonstrating accountability and willingness to make amends for the mistake.

25. D: honesty was more valuable than the telescope - Mr. Chen's response emphasized: "Mr. Chen said my honesty meant more than the telescope." This teaches that character and integrity outweigh material objects.

26. C: solve puzzles and use tools - The passage states: "They can solve puzzles, use tools, and even recognize individual humans." These cognitive abilities demonstrate remarkable intelligence for an invertebrate.

27. E: 500 million - The passage specifies: "With about 500 million neurons—two-thirds located in their arms." This large neuron count enables complex behaviors.

28. B: their arms - The passage explains: "about 500 million neurons—two-thirds located in their arms." This unusual distribution allows decentralized intelligence.

29. A: think semi-independently - The passage notes: "Each arm can 'think' semi-independently, allowing the octopus to explore multiple directions simultaneously." This distributed cognition is unique.

30. D: explore multiple directions simultaneously - The passage states this decentralized intelligence "allowing the octopus to explore multiple directions simultaneously while the brain handles complex decisions." This provides a survival advantage.

31. C: advanced math program - The letter's content is revealed: "You're invited to join the advanced math program." This opportunity creates the narrator's internal conflict.

32. E: heart pounding with mixed feelings - The passage describes: "I stared at it, heart pounding." The narrator experiences a mixture of excitement and fear, shown by physical anxiety symptoms.

33. B: harder work and more pressure - The narrator considers: "Advanced meant harder work, more pressure, possibly failing." These concerns reflect realistic assessment of challenges.

34. A: accept the invitation - The passage states: "I checked the box marked 'Yes' before fear could change my mind." Despite anxiety, the narrator chooses to accept.

35. D: choosing growth over comfort - The passage concludes: "Sometimes courage is just choosing growth over comfort." This insight reframes bravery as choosing development despite fear.

36. C: dinoflagellates - The passage identifies: "Bioluminescent algae, called dinoflagellates, create glowing blue waves." This scientific name is provided immediately.

37. E: disturbed - The passage states: "create glowing blue waves when disturbed." Physical disturbance triggers the bioluminescent response.

38. B: a defense mechanism - The passage explains: "This light production... serves as a defense mechanism." The glow protects the algae from predators.

39. A: startle predators or attract their predators - The passage details: "the sudden brightness can startle predators or attract larger predators to eat whatever is disturbing the algae." This two-pronged defense strategy is clever.

40. D: algae blooms at night - The passage notes: "This phenomenon turns nighttime beaches into magical, glowing landscapes during algae blooms." Both nighttime and bloom conditions are necessary for visible displays.

41. C: 1799 - The passage begins: "The Rosetta Stone, discovered in 1799." This specific date marks a turning point in understanding ancient Egypt.

42. E: three - The passage states: "The stone contains the same text in three scripts: hieroglyphs, Demotic Egyptian, and ancient Greek." The trilingual text was key to decipherment.

43. B: ancient Greek - The passage explains: "Since scholars could read Greek, they used it to decode the other two scripts." Greek served as the translation key.

44. A: deciphering hieroglyphs - The passage notes the stone "was key to deciphering Egyptian hieroglyphs." This breakthrough opened Egyptian history to modern understanding.

45. D: 3,000 - The passage states: "unlocking 3,000 years of previously unreadable Egyptian history." This vast time period had been inaccessible before the Rosetta Stone's decipherment.

46. C: Jamal - The text message identifies: "It was Jamal, who'd covered for her twice last month." Jamal is the coworker requesting help.

47. E: work his shift - The text asks: "Can you work my shift tomorrow? Family emergency." The request is clear and urgent.

48. B: only day off in two weeks - The passage states: "Tomorrow was her only day off in two weeks, and she'd planned to catch up on sleep." This emphasizes the sacrifice Maria makes.

49. E: catch up on sleep - Maria "had planned to catch up on sleep," showing she was exhausted and needed rest, making her decision more meaningful.

50. D: Jamal had helped her before - Maria "remembered Jamal's kindness" because he'd "covered for her twice last month." Reciprocity and gratitude motivate her decision.

51. C: water bears - The passage introduces: "Tardigrades, called 'water bears,' are microscopic animals." This nickname reflects their appearance.

52. E: from near absolute zero to 300°F - The passage states: "They can withstand temperatures from near absolute zero to 300°F." This extraordinary temperature range demonstrates their resilience.

53. B: cryptobiosis - The passage explains: "In harsh conditions, they enter cryptobiosis—a death-like state where metabolism nearly stops." This survival mechanism is unique.

54. A: nearly stops - During cryptobiosis, "metabolism nearly stops," allowing tardigrades to survive without resources for extended periods.

55. D: decades - The passage notes tardigrades "can survive for decades until conditions improve." This extreme durability is remarkable for such tiny organisms.

56. C: the narrator's locker - The passage begins: "The note taped to my locker read..." The locker is where the hurtful message was left.

57. E: shaming - The note stated: "Everyone knows what you did. You should be ashamed." This is clearly intended to shame and hurt.

58. B: felt doubtful and shaken - The narrator describes: "My hands shook. I hadn't done anything wrong—or had I? Doubt crept in." The note's psychological impact was immediate.

59. A: ignore the note - Zara advised: "Ignore it... Someone's trying to make you feel small. Don't let them." This wise counsel helps the narrator resist manipulation.

60. D: showing up when someone's being torn down - The passage concludes: "Sometimes friendship is just showing up when someone's being torn down." Physical presence and support matter most.

61. C: sunlight into chemical energy - The passage defines: "Photosynthesis is the process by which plants convert sunlight into chemical energy." This fundamental process powers plant life.

62. E: chlorophyll - The passage identifies: "Using chlorophyll in their leaves, plants capture light energy." Chlorophyll is the green pigment essential for photosynthesis.

63. B: glucose and oxygen - The passage states plants "combine water and carbon dioxide to produce glucose and oxygen." These products support plant growth and provide oxygen for other life.

64. A: leaves - Chlorophyll is located "in their leaves," making leaves the primary site of photosynthesis, though some photosynthesis can occur in green stems.

65. D: is required by most life on Earth - The passage notes oxygen "that most life on Earth requires to survive." Photosynthesis generates the atmospheric oxygen that aerobic organisms need.

66. C: on the bus - The passage begins: "I found the wallet on the bus—thick with cash and credit cards." The location establishes the scenario.

67. E: cash and credit cards - The wallet was "thick with cash and credit cards" and contained "an ID," making it valuable and identifiable.

68. B: kept the money - The narrator acknowledges: "I could have kept the money. Nobody would know." This temptation makes the choice more meaningful.

69. A: took it to Marcus's address - The narrator "took the bus to his address," going significantly out of their way to return the wallet directly.

70. D: who you want to be - The passage concludes: "doing the right thing isn't about who's watching. It's about who you want to be." Character is about internal values, not external rewards.

71. C: North Pacific Ocean - The passage identifies: "The Great Pacific Garbage Patch is a massive collection of marine debris in the North Pacific Ocean." This location is specific.

72. E: diffuse microplastics - The passage clarifies: "it's not a solid island of trash but rather a diffuse soup of microplastics suspended throughout the water column." This corrects common misconceptions.

73. B: ingestion and entanglement - The passage states the debris "harms marine life through ingestion and entanglement." Both mechanisms cause injury and death.

74. A: ocean currents concentrating debris - The passage explains: "Currents concentrate the debris." Ocean circulation patterns create this accumulation zone.

75. D: tiny particles are hard to remove without harming plankton - The passage notes: "the difficulty of removing tiny plastic particles without harming plankton." Cleanup technology must be selective to avoid ecological damage.

76. C: not to start the narrator - The passage begins: "Coach told me I wasn't starting in the championship game." This decision creates the narrator's emotional conflict.

77. E: she'd worked harder in practice - The coach explained: "She's worked harder in practice." This merit-based decision values effort over raw talent.

78. B: hurt and frustrated - The narrator describes: "I felt my eyes burn. I was faster, more experienced." These feelings of disappointment are natural and honest.

79. A: talent and heart both matter - Watching Emma, the narrator "realized something. Talent matters. But so does heart." This balanced insight represents growth.

80. D: both talent and heart/effort - The passage concludes: "sometimes the person who deserves it most isn't the one with the best stats." Merit combines ability with dedication.

81. C: "see" using sound - The passage defines: "Echolocation allows bats and dolphins to 'see' using sound." This biological sonar replaces vision in dark or murky environments.

82. E: high-frequency clicks - The passage explains: "They emit high-frequency clicks and listen for echoes bouncing off objects." These sounds are often beyond human hearing range.

83. B: distance, size, shape, and texture - The passage states: "The time between emission and echo return, plus echo characteristics, reveals an object's distance, size, shape, and texture." This detailed information enables navigation and hunting.

84. A: mosquitoes - The passage notes: "bats can detect insects as small as mosquitoes in complete darkness." This precision demonstrates echolocation's sensitivity.

85. D: distinguish between types of fish - The passage states: "dolphins can distinguish between different types of fish." This discrimination ability helps with selective hunting.

86. C: a teacher recommendation - The email subject indicates: "Scholarship Application—Requires Teacher Recommendation." This requirement creates the narrator's dilemma.

87. E: tomorrow - The passage states: "Deadline: tomorrow. I'd waited too long." The time pressure intensifies the narrator's anxiety about asking.

88. B: Ms. Rodriguez had already helped many students - The narrator notes: "Ms. Rodriguez had already helped three other students this week. Asking felt selfish." This concern shows consideration for the teacher's time.

89. A: to smile and stay late to help - Ms. Rodriguez's response was warm: "she smiled. 'That's what I'm here for,' she said, staying late to write it." Her generosity exceeded expectations.

90. E: can be brave - The narrator learned: "asking for help isn't weakness—sometimes it's the bravest thing you can do." This reframes vulnerability as courage.

91. C: evolve to survive antibiotics - The passage defines: "Antibiotic resistance occurs when bacteria evolve to survive drugs designed to kill them." This evolutionary adaptation is the core problem.

92. E: overuse and misuse of antibiotics - The passage states: "Overuse and misuse of antibiotics accelerates this evolution." Human behavior drives bacterial adaptation.

93. B: leave resistant bacteria to multiply - The passage explains: "When patients don't complete antibiotic courses, they kill susceptible bacteria but leave resistant ones to multiply." Incomplete treatment creates selection pressure.

94. A: harder or impossible to treat - Though not explicitly stated with these exact words, the passage notes resistant bacteria make "once-treatable infections deadly," implying they become much harder or impossible to treat.

95. D: use antibiotics only when necessary and complete courses - The passage concludes: "Preventing resistance requires using antibiotics only when necessary and always completing prescribed courses." Both practices are essential.

96. C: why their dad doesn't live with them - Leo asked: "why our dad doesn't live with us anymore." This difficult question requires a thoughtful, age-appropriate answer.

97. E: six years old - The passage states: "He's six. How do you explain divorce to a six-year-old?" This young age makes the conversation more challenging.

98. B: love each other but can't live together - The narrator explained: "Sometimes people love each other but can't live together. It doesn't mean they stop loving you." This answer acknowledges complexity while reassuring Leo.

99. A: his dad still loved them - Leo's follow-up question was: "Does Dad still love us?" This reveals his primary fear—that the separation means lost parental love.

100. D: having answers while still figuring things out yourself - The passage concludes: "Sometimes being a big sibling means having answers even when you're still figuring things out yourself." Leadership sometimes requires confidence despite personal uncertainty.

Verbal

1. B: lively - Vibrant and lively both mean full of energy and enthusiasm, animated. "A vibrant personality" and "a lively spirit" describe the same energetic quality. Both indicate vitality and brightness.

2. D: essential - Crucial and essential both mean extremely important, necessary. "A crucial decision" and "an essential choice" carry the same weight of importance. Both indicate something cannot be omitted.

3. A: peaceful - Tranquil and peaceful both mean calm and quiet, serene. "A tranquil lake" and "a peaceful setting" describe the same undisturbed state. Both indicate absence of disturbance.

4. C: articulate - Eloquent and articulate both mean fluent and persuasive in speaking or writing, expressive. "An eloquent speaker" and "an articulate presenter" both communicate effectively. Both indicate skillful expression.

5. E: ordinary - Mundane and ordinary both mean lacking excitement or interest, commonplace. "Mundane tasks" and "ordinary chores" describe the same routine activities. Both indicate the opposite of special.

6. B: strong - Robust and strong both mean sturdy and healthy, vigorous. "Robust health" and "strong constitution" describe the same physical strength. Both indicate power and durability.

7. D: new - Novel and new both mean original and unusual, fresh. "A novel approach" and "a new method" describe innovative ideas. Both indicate something not seen before.

8. A: consider - Contemplate and consider both mean think about carefully, ponder. "Contemplate the options" and "consider the choices" describe the same thoughtful process. Both indicate deliberation.

9. C: passionate - Fervent and passionate both mean having intense feeling, ardent. "Fervent belief" and "passionate conviction" show the same intensity. Both indicate strong emotion or dedication.

10. E: vague - Ambiguous and vague both mean open to more than one interpretation, unclear. "An ambiguous statement" and "a vague comment" both create confusion. Both indicate lack of clarity.

11. B: calm - Serene and calm both mean peaceful and untroubled, tranquil. "A serene expression" and "a calm demeanor" show the same composure. Both indicate inner peace.

12. D: obvious - Conspicuous and obvious both mean clearly visible or noticeable, prominent. "Conspicuous behavior" and "obvious actions" are both easily seen. Both indicate standing out.

13. A: unimportant - Trivial and unimportant both mean of little value or significance, minor. "Trivial matters" and "unimportant details" describe things that don't matter much. Both indicate insignificance.

14. C: kind - Benevolent and kind both mean well-meaning and kindly, generous. "A benevolent donor" and "a kind benefactor" both show goodwill. Both indicate charitable nature.

15. E: inactive - Dormant and inactive both mean temporarily not active, latent. "A dormant volcano" and "inactive machinery" both describe suspended activity. Both indicate temporary rest.

16. B: dry - Arid and dry both mean having little or no rain, parched. "Arid climate" and "dry desert" describe the same lack of moisture. Both indicate absence of water.

17. D: boring - Tedious and boring both mean too long, slow, or dull, monotonous. "Tedious work" and "boring tasks" both lack interest. Both indicate wearying repetition.

18. A: economical - Frugal and economical both mean sparing or thrifty with money, careful. "Frugal spending" and "economical habits" both show financial prudence. Both indicate avoiding waste.

19. C: pure - Pristine and pure both mean in original condition, unspoiled. "Pristine wilderness" and "pure environment" describe the same untouched state. Both indicate perfection.

20. E: threatening - Ominous and threatening both mean giving the impression something bad will happen, menacing. "Ominous clouds" and "threatening skies" suggest danger. Both indicate foreboding.

21. B: bold - Audacious and bold both mean showing a willingness to take risks, daring. "An audacious plan" and "a bold strategy" both require courage. Both indicate fearless action.

22. D: scanty - Meager and scanty both mean lacking in quantity or quality, insufficient. "Meager portions" and "scanty supplies" both indicate inadequate amounts. Both mean barely enough.

23. A: frank - Candid and frank both mean truthful and straightforward, honest. "Candid opinion" and "frank assessment" both express truth directly. Both indicate openness.

24. C: playful - Whimsical and playful both mean playfully quaint or fanciful, imaginative. "Whimsical humor" and "playful creativity" both show lighthearted imagination. Both indicate fun spontaneity.

25. E: outdated - Obsolete and outdated both mean no longer in use, antiquated. "Obsolete technology" and "outdated equipment" are both surpassed by newer versions. Both indicate being behind the times.

26. B: brave - Valiant and brave both mean showing courage, heroic. "A valiant effort" and "brave action" both demonstrate fearlessness. Both indicate heroism.

27. D: delicate - Subtle and delicate both mean so fine as to be difficult to perceive, nuanced. "Subtle differences" and "delicate distinctions" both require careful attention. Both indicate refinement.

28. A: understanding - Empathy and understanding both mean the ability to understand another's feelings, compassion. "Show empathy" and "demonstrate understanding" both involve emotional connection. Both indicate sensitivity.

29. C: enthusiastic - Zealous and enthusiastic both mean having great energy or enthusiasm, passionate. "Zealous support" and "enthusiastic backing" show the same fervor. Both indicate intense dedication.

30. E: strict - Stringent and strict both mean rigorous and demanding, severe. "Stringent rules" and "strict regulations" both enforce compliance firmly. Both indicate inflexibility.

31. B: inborn - Innate and inborn both mean existing from birth, natural. "Innate ability" and "inborn talent" are both present naturally. Both indicate not learned or acquired.

32. D: profitable - Lucrative and profitable both mean producing a great deal of profit, money-making. "Lucrative business" and "profitable venture" both generate income. Both indicate financial success.

33. A: unpredictable - Erratic and unpredictable both mean not even or regular, inconsistent. "Erratic behavior" and "unpredictable actions" both lack pattern. Both indicate instability.

34. C: tranquil - Placid and tranquil both mean not easily upset or excited, calm. "Placid waters" and "tranquil lake" describe the same peaceful surface. Both indicate serenity.

35. E: barren - Desolate and barren both mean deserted and empty, bleak. "Desolate landscape" and "barren wasteland" both lack life. Both indicate emptiness.

36. B: plentiful - Ample and plentiful both mean enough or more than enough, abundant. "Ample supply" and "plentiful resources" both indicate sufficiency. Both mean more than adequate.

37. D: brief - Concise and brief both mean giving information clearly in few words, succinct. "Concise summary" and "brief overview" both economize words. Both indicate brevity.

38. A: hardworking - Diligent and hardworking both mean showing care and effort, industrious. "Diligent student" and "hardworking pupil" both demonstrate dedication. Both indicate conscientiousness.

39. C: useless - Futile and useless both mean incapable of producing any result, pointless. "Futile attempt" and "useless effort" both fail to achieve goals. Both indicate ineffectiveness.

40. E: sociable - Gregarious and sociable both mean fond of company, outgoing. "Gregarious person" and "sociable individual" both enjoy social interaction. Both indicate friendliness.

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

42. D: warm - Cordial and warm both mean warm and friendly, affable. "Cordial greeting" and "warm welcome" convey the same friendliness. Both indicate genuine hospitality.

43. A: impending - Imminent and impending both mean about to happen, approaching. "Imminent danger" and "impending threat" are both very near. Both indicate something soon to occur.

44. C: silly - Frivolous and silly both mean not having serious purpose, trivial. "Frivolous complaint" and "silly objection" both lack importance. Both indicate lack of seriousness.

45. E: careful - Meticulous and careful both mean showing great attention to detail, thorough. "Meticulous work" and "careful effort" both demonstrate precision. Both indicate exactness.

46. B: wordy - Verbose and wordy both mean using more words than needed, long-winded. "Verbose explanation" and "wordy description" both contain excess verbiage. Both indicate prolixity.

47. D: persistent - Tenacious and persistent both mean not readily giving up, determined. "Tenacious effort" and "persistent work" both show staying power. Both indicate determination.

48. A: skilled - Proficient and skilled both mean competent or skilled, expert. "Proficient musician" and "skilled performer" both demonstrate ability. Both indicate mastery.

49. C: serious - Somber and serious both mean dark or dull in mood, grave. "Somber mood" and "serious atmosphere" convey the same gravity. Both indicate solemnity.

50. E: outstanding - Exemplary and outstanding both mean serving as a desirable model, excellent. "Exemplary performance" and "outstanding work" both represent the best. Both indicate superiority.

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

52. B: wet is to dry - **Relationship: Opposite physical states.** Hot is the opposite of cold, just as wet is the opposite of dry. Both pairs show contrasting conditions.

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

54. A: petal is to flower - **Relationship: Part to whole.** A leaf is part of a tree, just as a petal is part of a flower. Both show components of plant structures.

55. C: sad is to sorrowful - **Relationship: Synonymous emotions.** Happy and joyful are synonyms, just as sad and sorrowful are synonyms. Both pairs show words with similar meanings describing feelings.

56. D: bee is to hive - **Relationship: Animal to its dwelling.** A bird lives in a nest, just as a bee lives in a hive. Both show creatures and their constructed homes.

57. B: verse is to poem - Relationship: Subdivision to whole work. A chapter is a section of a book, just as a verse is a section of a poem. Both show organizational units within larger works.

58. E: screwdriver is to screw - Relationship: Tool to object it manipulates. A hammer drives nails, just as a screwdriver turns screws. Both show hand tools and their corresponding fasteners.

59. A: summer is to hot - Relationship: Season to characteristic temperature. Winter is characterized by cold, just as summer is characterized by hot weather. Both show seasons and their typical temperatures.

60. C: rudder is to ship - Relationship: Steering mechanism to vehicle. A steering wheel controls a car's direction, just as a rudder controls a ship's direction. Both show directional control devices.

61. D: composer is to symphony - Relationship: Creator to creation. An author creates a novel, just as a composer creates a symphony. Both show artists and their specific artistic products.

62. B: egg is to chicken - Relationship: Early form to mature organism. A seed grows into a plant, just as an egg develops into a chicken. Both show developmental origins.

63. E: aquarium is to fish - Relationship: Container/facility to what it houses. A library contains books, just as an aquarium contains fish. Both show specialized facilities and their contents.

64. A: frown is to sadness - Relationship: Facial expression to emotion it indicates. A smile indicates happiness, just as a frown indicates sadness. Both show physical expressions of feelings.

65. C: speedometer is to speed - Relationship: Measuring instrument to what it measures. A thermometer measures temperature, just as a speedometer measures speed. Both show instruments and their specific measurements.

66. D: tiara is to queen - Relationship: Crown/headpiece to royal wearer. A crown is worn by a king, just as a tiara is worn by a queen. Both show royal headwear and their wearers.

67. B: famine is to food - Relationship: Crisis of scarcity to what is scarce. Drought is a lack of rain, just as famine is a lack of food. Both show critical shortages.

68. E: engineer is to bridge - Relationship: Designer to structure designed. An architect designs buildings, just as an engineer designs bridges. Both show professionals and their designed structures.

69. A: acorn is to oak - Relationship: Seed/early form to mature organism. A bud develops into a flower, just as an acorn grows into an oak tree. Both show developmental stages.

70. C: windshield is to car - Relationship: Transparent viewing surface to vehicle. A lens allows viewing through a camera, just as a windshield allows viewing from a car. Both show transparent surfaces enabling vision.

71. D: refrain is to music - Relationship: Repeated section to artistic work. A chorus is a repeated section of a song, just as a refrain is a repeated section of music. Both show recurring elements in compositions.

72. B: caterpillar is to butterfly - Relationship: Larval stage to adult form through metamorphosis. A tadpole transforms into a frog, just as a caterpillar transforms into a butterfly. Both show dramatic developmental transformations.

73. E: neigh is to horse - Relationship: Characteristic sound to animal making it. Bark is the sound a dog makes, just as neigh is the sound a horse makes. Both show animals and their vocalizations.

74. A: island is to ocean - Relationship: Isolated feature within larger environment. An oasis is an isolated feature in a desert, just as an island is an isolated feature in an ocean. Both show small habitable areas within vast expanses.

75. C: retirement is to worker - Relationship: Ceremonial end/transition to person experiencing it. Graduation marks the end of being a student, just as retirement marks the end of being a worker. Both show major life transitions.

76. D: gavel is to judge - Relationship: Professional tool to profession. A stethoscope is a doctor's tool, just as a gavel is a judge's tool. Both show characteristic implements of professions.

77. B: beginning is to end - Relationship: Opposite positions in sequence. A prologue comes at the start while epilogue comes at the finish, just as beginning and end are opposites. Both pairs show contrasting positions.

78. E: formula is to textbook - Relationship: Specific instruction/information to book containing it. A recipe is contained in a cookbook, just as a formula is contained in a textbook. Both show specific information within reference books.

79. A: practice is to game - Relationship: Preparation to actual event. Rehearse prepares you for a performance, just as practice prepares you for a game. Both show preparation activities before main events.

80. C: potter is to clay - Relationship: Artist to primary medium. A sculptor works with clay (among other materials), just as a potter specifically works with clay. Both show artists and their working materials.

81. D: archipelago is to islands - Relationship: Collective term for group to individual members. A constellation is a group of stars, just as an archipelago is a group of islands. Both show collections of similar elements.

82. B: hurricane is to wind - Relationship: Severe weather event to its primary element. A blizzard is characterized by intense snow, just as a hurricane is characterized by intense wind. Both show extreme weather and defining elements.

83. E: choir is to singers - Relationship: Musical group to members. An orchestra consists of musicians, just as a choir consists of singers. Both show musical ensembles and their performers.

84. A: keyboard is to notes - Relationship: Organized display/arrangement to elements displayed. A palette organizes colors, just as a keyboard organizes notes. Both show systems for accessing and organizing elements.

85. C: chrysalis is to moth - Relationship: Protective case during metamorphosis to emerging insect. A cocoon protects a developing butterfly, just as a chrysalis protects a developing moth. Both show metamorphosis stages (note: technically butterflies form chrysalises and moths form cocoons, but they're similar protective structures).

86. D: microscope is to tiny - Relationship: Viewing instrument to size of objects it helps observe. A telescope helps view distant objects, just as a microscope helps view tiny objects. Both show optical instruments and the scale they address.

87. B: flood is to wet - Relationship: Weather condition to resulting state. Drought causes dry conditions, just as flood causes wet conditions. Both show weather events and their effects.

88. E: conservatory is to music - Relationship: Specialized institution to art form it preserves/teaches. A gallery displays art, just as a conservatory teaches and preserves music. Both show institutions dedicated to specific art forms.

89. A: trickle is to pour - Relationship: Gentle/minimal to intense/maximal action. Whisper is quiet speaking while shout is loud speaking, just as trickle is slow flow while pour is rapid flow. Both show intensity contrasts in similar actions.

90. C: speedometer is to speeding - Relationship: Measuring device to excessive condition it can detect. A thermometer detects fever (excessive temperature), just as a speedometer detects speeding (excessive speed). Both show instruments and the excessive conditions they reveal.

91. D: receive is to send - Relationship: Opposite directional actions. Import means bring in while export means send out, just as receive means take in while send means transmit out. Both pairs show opposite directions of transfer.

92. B: dentist is to teeth - Relationship: Medical specialist to body part treated. An optometrist treats eyes, just as a dentist treats teeth. Both show medical professionals and their areas of specialization.

93. E: roots is to tree - Relationship: Anchoring mechanism to what it anchors. An anchor holds a ship in place, just as roots hold a tree in place. Both show structures that prevent movement.

94. A: pit is to peach - Relationship: Hard center to fruit containing it. A yolk is the center of an egg, just as a pit is the center of a peach. Both show inner components of natural objects.

95. C: haiku is to poetry - Relationship: Specific form to general category. A sonnet is a specific type of poem, just as a haiku is a specific type of poetry. Both show particular forms within a broader artistic category.

96. D: condense is to gas - Relationship: Phase change process to state changing from. Evaporate changes liquid to gas, just as condense changes gas to liquid. Both show opposite phase transitions.

97. B: boo is to disapproval - Relationship: Audience response to sentiment expressed. Applause expresses approval, just as boo expresses disapproval. Both show vocal/physical expressions of judgment.

98. E: calendar is to date - Relationship: Tool to specific information it provides. A compass shows direction, just as a calendar shows dates. Both show reference tools and the information they display.

99. A: introduction is to essay - Relationship: Opening section to document. A preamble is the introduction to a constitution, just as an introduction is the opening of an essay. Both show initial sections that set context.

100. C: novice is to expert - Relationship: Beginner to master in skill progression. An apprentice learns from a master, just as a novice develops toward becoming an expert. Both show the journey from beginner to accomplished practitioner.

Quantitative

1. E: 14 - Divide 672 by 48: $672 \div 48 = 14$. Check: $48 \times 14 = 672$ ✓ This is a division fact that can be solved by long division or by recognizing that $48 \times 10 = 480$, and $672 - 480 = 192$, and $48 \times 4 = 192$, so $10 + 4 = 14$.

2. C: 17 - Solve $4x + 23 = 91$ in two steps. Subtract 23 from both sides: $4x = 68$. Divide both sides by 4: $x = 17$. Check: $4(17) + 23 = 68 + 23 = 91$ ✓

3. A: 72 - The LCM is the smallest number both numbers divide into evenly. List multiples: 24: 24, 48, 72, 96... and 36: 36, 72, 108... The first common multiple is 72. Verify: $72 \div 24 = 3$ ✓ and $72 \div 36 = 2$ ✓

4. B: 17 - Follow order of operations (PEMDAS). Divide first: $24 \div 4 = 6$. Then work left to right: $18 + 6 = 24$, then $24 - 7 = 17$. Division must be done before addition and subtraction.

5. D: 24 - Calculate each exponent, then subtract. $7^2 = 7 \times 7 = 49$. Then $5^2 = 5 \times 5 = 25$. Finally subtract: $49 - 25 = 24$. Remember to calculate exponents before subtraction.

6. E: 138 - Solve $m + 103 = 241$ by subtracting 103 from both sides: $m = 241 - 103 = 138$. Check: $138 + 103 = 241$ ✓ To undo addition, use subtraction.

7. C: 12 - The GCF is the largest number that divides both evenly. Factors of 60: 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60. Factors of 84: 1, 2, 3, 4, 6, 7, 12, 14, 21, 28, 42, 84. The greatest common factor is 12. Check: $60 \div 12 = 5$ ✓ and $84 \div 12 = 7$ ✓

8. A: 64 - Follow order of operations. Parentheses first: 16 + 12 = 28. Then multiply: 28 × 3 = 84. Finally subtract: 84 − 20 = 64. Parentheses are always calculated first.

9. B: 53 - A prime number has exactly two factors: 1 and itself. Check each: 51 = 3 × 17 (not prime), 53 can only be divided by 1 and 53 (prime), 54 = 2 × 27 (not prime), 55 = 5 × 11 (not prime), 56 = 7 × 8 (not prime). Prime numbers are fundamental building blocks.

10. D: 5/7 - When adding fractions with the same denominator, keep the denominator and add numerators: 2/7 + 3/7 = (2 + 3)/7 = 5/7. The denominator stays 7; only add the numerators.

11. E: 50 - Follow order of operations (PEMDAS). Multiply first: 18 × 9 = 162. Then work left to right: 200 − 162 = 38, then 38 + 12 = 50. Multiplication must be done before addition and subtraction.

12. C: 37 - The absolute value of a number is its distance from zero, always positive. |−37| = 37 because −37 is 37 units away from 0 on the number line. Absolute value removes the negative sign.

13. A: 9,600 - When rounding to the nearest hundred, look at the tens digit. In 9,573, the tens digit is 7. Since 7 ≥ 5, round up: the hundreds digit increases from 5 to 6, making 9,600.

14. B: 1/3 - When subtracting fractions with the same denominator, keep the denominator and subtract numerators: 4/9 − 1/9 = (4 − 1)/9 = 3/9. Simplify by dividing both by 3: 3/9 = 1/3. Always simplify fractions to lowest terms.

15. D: 86 - Follow order of operations. Multiply first: 8 × 7 = 56 and 5 × 6 = 30. Then add: 56 + 30 = 86. Both multiplications must be completed before addition.

16. E: 125 - Calculate the exponent: $5^3 = 5 \times 5 \times 5 = 25 \times 5 = 125$. An exponent indicates how many times to multiply the base by itself. 5 cubed means 5 multiplied by itself three times.

17. C: 256 - Solve b − 89 = 167 by adding 89 to both sides: b = 167 + 89 = 256. Check: 256 − 89 = 167 ✓ To undo subtraction, use addition.

18. A: 48 - A number divisible by both 4 and 6 must be divisible by 12 (the LCM of 4 and 6). Check the options: 48 ÷ 12 = 4 ✓. Also verify: 48 ÷ 4 = 12 ✓ and 48 ÷ 6 = 8 ✓. The other options don't divide evenly by 12.

19. B: 4/5 - When adding fractions with the same denominator, keep the denominator and add numerators: 3/5 + 1/5 = (3 + 1)/5 = 4/5. The denominator stays 5; only add the numerators.

20. D: 38 - Follow order of operations. Multiply first: 12 × 10 = 120. Then work left to right: 150 − 120 = 30, then 30 + 8 = 38. Multiplication must be done before addition and subtraction.

21. E: 3/20 - When multiplying fractions, multiply numerators together and denominators together: (3 × 2)/(8 × 5) = 6/40. Simplify by dividing both by 2: 6/40 = 3/20. Always simplify after multiplying fractions.

22. C: 0.36 - To convert a fraction to decimal, divide numerator by denominator: 9 ÷ 25 = 0.36. Check by converting back: 0.36 = 36/100 = 9/25 ✓ (after simplifying by 4).

23. A: 126 - To find 180% of 70, multiply: 1.80 × 70 = 126. Percentages over 100% result in values larger than the original number. 180% means "one and eight-tenths times" the original.

24. B: 3/4 - Simplify 24/32 by finding the GCF of 24 and 32, which is 8. Divide both numerator and denominator by 8: 24 ÷ 8 = 3 and 32 ÷ 8 = 4, giving 3/4. Check: 3/4 = 0.75 and 24/32 = 0.75 ✓

25. D: 1.47 - Line up the decimal points and add: 0.80 + 0.67 = 1.47. When adding decimals, ensure decimal points are aligned vertically for accurate calculation.

26. E: 9 - The ratio 5:3 means for every 5 cats, there are 3 dogs. If there are 15 cats, find how many groups of 5: 15 ÷ 5 = 3 groups. Each group has 3 dogs, so total dogs = 3 × 3 = 9. Or use proportion: 5/3 = 15/x, cross multiply: 5x = 45, so x = 9.

27. C: 84 - To find 35% of 240, multiply: 0.35 × 240 = 84. Mental math: 10% of 240 is 24, so 35% is 3.5 × 24 = 84. Breaking percentages into 10% chunks makes calculation easier.

28. A: 4/5 - Convert to common denominator to compare. Using 20ths: 3/4 = 15/20, 7/10 = 14/20, 4/5 = 16/20. Since 16/20 is largest, 4/5 is greatest. Or convert to decimals: 3/4 = 0.75, 7/10 = 0.70, 4/5 = 0.80. Clearly 0.80 is largest.

29. B: 1.8 - Multiply decimals: 3.6 × 0.5 = 1.8. Count decimal places: 3.6 has 1 decimal place, 0.5 has 1 decimal place, so the product should have 2 decimal places. 36 × 5 = 180, so 3.6 × 0.5 = 1.80 = 1.8.

30. D: $140 - A 75% markup means the selling price is 175% of cost. Calculate: 1.75 × $80 = $140. Or find markup amount: 0.75 × $80 = $60, then add: $80 + $60 = $140. Markup percentages add to the original cost.

31. E: 7/4 - When dividing fractions, multiply by the reciprocal: 7/12 ÷ 1/3 = 7/12 × 3/1 = (7 × 3)/(12 × 1) = 21/12. Simplify by dividing both by 3: 21/12 = 7/4. Dividing by a fraction is the same as multiplying by its reciprocal.

32. C: 3/50 - Write 0.06 as 6/100. Simplify by dividing both by 2: 6 ÷ 2 = 3 and 100 ÷ 2 = 50, giving 3/50. Check: 3 ÷ 50 = 0.06 ✓

33. A: 30% - Set up the equation: (x/100) × 90 = 27. Solve: 90x = 2700, so x = 30. Therefore 27 is 30% of 90. Or think: 27 is 27/90 = 3/10 = 30/100 = 30%.

34. B: 5 11/15 - Convert to improper fractions: 2 1/3 = 7/3 and 3 2/5 = 17/5. Find common denominator (15): 7/3 = 35/15 and 17/5 = 51/15. Add: 35/15 + 51/15 = 86/15. Convert back to mixed number: 86 ÷ 15 = 5 remainder 11, so 5 11/15.

35. D: 98 - If 4/7 of a number equals 56, set up equation: (4/7)n = 56. Multiply both sides by 7/4: n = 56 × (7/4) = 392/4 = 98. Check: (4/7) × 98 = 392/7 = 56 ✓

36. E: 3:4 - Simplify the ratio 36:48 by dividing both numbers by their GCF, which is 12. 36 ÷ 12 = 3 and 48 ÷ 12 = 4, giving 3:4. Check: 3 × 12 = 36 and 4 × 12 = 48 ✓

37. C: 4.55 - Align decimal points and subtract: 9.40 − 4.85 = 4.55. When subtracting, you may need to rewrite 9.4 as 9.40 to align decimal places properly. Borrowing works the same as with whole numbers.

38. A: approximately $214 - If $150 is the price after a 30% discount, it represents 70% of the original price. Set up equation: 0.70x = 150. Solve: x = 150 ÷ 0.70 = 214.29 ≈ $214. Check: 0.70 × $214 ≈ $150 ✓ Working backwards from a discount requires dividing by the remaining percentage.

39. B: 2/3 - When adding fractions with the same denominator, keep the denominator and add numerators: 4/9 + 2/9 = (4 + 2)/9 = 6/9. Simplify by dividing both by 3: 6/9 = 2/3. The denominator stays 9; only add the numerators.

40. D: 24 - If x:y = 7:4 and x = 42, set up proportion: 7/4 = 42/y. Cross multiply: 7y = 168. Divide: y = 24. Check the ratio: 42:24 = 7:4 ✓ (after dividing both by 6).

41. E: 9 - Solve 3a + 11 = 38 in two steps. Subtract 11 from both sides: 3a = 27. Divide both sides by 3: a = 9. Check: 3(9) + 11 = 27 + 11 = 38 ✓

42. C: 38 - Substitute values: 4p + 3q = 4(5) + 3(6) = 20 + 18 = 38. Always perform multiplication before addition when evaluating expressions.

43. A: 8 - Solve 6n − 9 = 39 in two steps. Add 9 to both sides: 6n = 48. Divide both sides by 6: n = 8. Check: 6(8) − 9 = 48 − 9 = 39 ✓

44. B: 5y + 20 - Distribute the 5 to both terms inside the parentheses: 5(y + 4) = 5·y + 5·4 = 5y + 20. Distribution means multiplying each term inside by the number outside.

45. D: 121 - Calculate the exponent: $n^2 = 11^2 = 11 \times 11 = 121$. Squaring a number means multiplying it by itself.

46. E: 63 - Solve m/7 = 9 by multiplying both sides by 7: m = 9 × 7 = 63. Check: 63 ÷ 7 = 9 ✓ Multiplication undoes division.

47. C: 3 - Solve 4(k + 5) = 32 by first dividing both sides by 4: k + 5 = 8. Then subtract 5: k = 3. Check: 4(3 + 5) = 4(8) = 32 ✓

48. A: 8x - Combine like terms: 3x + 5x = (3 + 5)x = 8x. When adding terms with the same variable, add the coefficients and keep the variable.

49. B: 22 - First substitute r = 4: 6r − 3r + 10 = 6(4) − 3(4) + 10. Then calculate: 24 − 12 + 10 = 22. Combine like terms first if possible: (6r − 3r) + 10 = 3r + 10 = 3(4) + 10 = 12 + 10 = 22.

50. D: 12 - Solve 8b = 96 by dividing both sides by 8: b = 96 ÷ 8 = 12. Check: 8 × 12 = 96 ✓ Division is the inverse of multiplication.

51. E: 72 - Perimeter of a square = 4 × side length = 4 × 18 = 72. All four sides of a square are equal, so multiply one side by 4.

52. C: 286 - Area of rectangle = length × width = 22 × 13 = 286 square units. Don't confuse with perimeter, which would be 2(22 + 13) = 70.

53. A: 56.52 - Circumference = $2\pi r$ = 2 × 3.14 × 9 = 56.52. The formula uses radius, not diameter. Circumference is the distance around a circle.

54. B: 210 - Area of triangle = (base × height) ÷ 2 = (28 × 15) ÷ 2 = 420 ÷ 2 = 210 square units. A triangle's area is always half that of a rectangle with the same base and height.

55. D: 240 - Volume of rectangular box = length × width × height = 6 × 5 × 8 = 240 cubic units. Volume measures the space inside a three-dimensional object.

56. E: 33 - An equilateral triangle has all three sides equal. If one side is 11, perimeter = 3 × 11 = 33. Equilateral means "equal-sided."

57. C: 452.16 - Area of circle = πr^2 = 3.14 × 12^2 = 3.14 × 144 = 452.16 square units. Don't confuse area (πr^2) with circumference ($2\pi r$).

58. A: 130 feet - Perimeter of rectangle = 2(length + width) = 2(40 + 25) = 2(65) = 130 feet. Walking around the perimeter means covering all four sides.

59. B: 220 - Area of parallelogram = base × height = 20 × 11 = 220 square units. Like a rectangle, multiply base times height, not times the slanted side.

60. D: 216 - Volume of cube = $edge^3$ = 6^3 = 6 × 6 × 6 = 216 cubic units. A cube has all edges equal, so volume is side cubed.

61. E: $33 - Calculate books: 4 × $6 = $24. Calculate pencils: 3 × $3 = $9. Total: $24 + $9 = $33. Break multi-step problems into simpler calculations.

62. C: 56 mph - Average speed = distance ÷ time = 280 miles ÷ 5 hours = 56 mph. Speed tells how far you travel per unit of time.

63. A: $29 - Calculate total spent: $28 + $35 = $63. Subtract from original amount: $92 − $63 = $29 remaining. Work through money problems step by step.

64. B: 12 - Divide total boxes by boxes per crate: 192 ÷ 16 = 12 crates. Check: 12 × 16 = 192 ✓ Division helps distribute items into equal groups.

65. D: 3000 meters - Total distance = laps × meters per lap = 6 × 500 = 3000 meters. Multiplication finds total when you have equal groups.

66. E: 6:15 PM - From 3:30 PM, add 2 hours 45 minutes. Add 2 hours: 3:30 + 2:00 = 5:30. Add 45 minutes: 5:30 + 0:45 = 6:15 PM. Break time calculations into hours and minutes separately.

67. C: 7 days - Divide total pages by pages per day: 420 ÷ 60 = 7 days. Check: 7 × 60 = 420 ✓ Division finds how many equal groups fit into a total.

68. A: 23°C - Add the temperature increase: 8°C + 15°C = 23°C. Temperature increase means addition, while temperature decrease means subtraction.

69. B: 3/5 - If Marcus eats 4 out of 10 slices, remaining = 10 − 4 = 6 slices out of 10 total = 6/10. Simplify: 6/10 = 3/5. Subtraction finds what remains.

70. D: 1080 cubic meters - Volume = length × width × depth = 30 × 12 × 3 = 1080 cubic meters. Volume requires all three dimensions multiplied together.

71. E: 24 - Average = sum ÷ count. Sum: 18 + 26 + 22 + 30 = 96. Count: 4 numbers. Average: 96 ÷ 4 = 24. The average (mean) is the sum divided by how many numbers.

72. C: $660 - Revenue = price × quantity = $12 × 55 = $660. Multiplication finds total revenue from unit price and quantity sold.

73. A: 9 - To find median, arrange in order: 4, 5, 9, 12, 15. The middle value (third out of five) is 9. The median is the middle value when numbers are arranged in order.

74. B: 167 - The sequence adds 23 each time. 1st: 29. 2nd: 29 + 23 = 52. 3rd: 52 + 23 = 75. 4th: 75 + 23 = 98. 5th: 98 + 23 = 121. 6th: 121 + 23 = 144. 7th: 144 + 23 = 167. Count carefully through arithmetic sequences.

75. D: 75 inches - Use Pythagorean theorem: $a^2 + b^2 = c^2$. Here: $60^2 + 45^2 = c^2$. Calculate: 3600 + 2025 = 5625. Therefore $c^2 = 5625$, so c = 75 inches. This is a multiple of the 3-4-5 right triangle (multiplied by 15).

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

77. C: 260 miles - Distance = speed × time = 65 mph × 4 hours = 260 miles. Multiply rate by time to find total distance traveled.

78. A: 7 - The mode is the number that appears most frequently. Count: 7 appears 3 times, 10 appears 2 times, 14 appears 1 time, 11 appears 1 time. Mode = 7. The mode is the most common value.

79. B: 12 - Divide total cookies by cookies per box: 168 ÷ 14 = 12 boxes. Check: 12 × 14 = 168 ✓ Division helps organize items into equal containers.

80. D: 21 - Range = highest value − lowest value. Highest: 35. Lowest: 14. Range: 35 − 14 = 21. The range shows the spread of data.

81. E: 60° - Sum of angles in a triangle = 180°. Given angles: 50° + 70° = 120°. Third angle: 180° − 120° = 60°. All triangle angles always sum to exactly 180°.

82. C: 30 inches - Divide total ribbon by number of pieces: 150 ÷ 5 = 30 inches per piece. Check: 5 × 30 = 150 ✓ Division creates equal parts.

83. A: 140 - Area of trapezoid = $(b_1 + b_2) \times h \div 2 = (12 + 16) \times 10 \div 2 = 28 \times 10 \div 2 = 280 \div 2 = 140$ square units. The trapezoid formula averages the two bases, then multiplies by height.

84. B: approximately 9 - Work backwards. If result is 60 after subtracting 20, then before subtracting: 60 + 20 = 80. If squaring gave 80, the number is $\sqrt{80} \approx 8.94 \approx 9$. Check: $9^2 - 20 = 81 - 20 = 61 \approx 60$ ✓ (close approximation).

85. D: 12 - Perimeter of rectangle = 2(length + width) = 66. So length + width = 33. If length = 21, then width = 33 − 21 = 12. Check: 2(21 + 12) = 2(33) = 66 ✓

86. E: 21 - Calculate step by step. 35% of 240 = 0.35 × 240 = 84. Then 25% of 84 = 0.25 × 84 = 21. Or combine: 0.25 × 0.35 × 240 = 0.0875 × 240 = 21.

87. C: 1/3 - Total marbles: 6 + 4 + 8 = 18. Red marbles: 6. Probability = 6/18 = 1/3 (after simplifying by 6). Count specific outcomes over total possible outcomes.

88. A: 150 - Surface area of cube = $6s^2 = 6 \times 5^2 = 6 \times 25 = 150$ square units. A cube has 6 faces, each with area s^2.

89. B: 405 - Examine pattern: each number is multiplied by 3. 5 × 3 = 15, 15 × 3 = 45, 45 × 3 = 135, 135 × 3 = 405. This is a geometric sequence with ratio 3.

90. D: $204 - First discount: $300 × 0.80 = $240 (after 20% off). Second discount: $240 × 0.85 = $204 (after additional 15% off the sale price). Sequential discounts multiply: 0.80 × 0.85 = 0.68, so final price is 68% of original.

91. E: 12 - Solve 6x − 15 = 4x + 9 by getting variables on one side. Subtract 4x from both sides: 2x − 15 = 9. Add 15 to both sides: 2x = 24. Divide by 2: x = 12. Check: 6(12) − 15 = 72 − 15 = 57 and 4(12) + 9 = 48 + 9 = 57 ✓

92. C: 20 - Substitute values: $a^2 - b^2 = 6^2 - 4^2 = 36 - 16 = 20$. This can also be factored using the difference of squares formula: $a^2 - b^2 = (a + b)(a - b) = (6 + 4)(6 - 4) = 10 \times 2 = 20$.

93. A: 15 - Solve 3(p − 7) = 24 by dividing both sides by 3 first: p − 7 = 8. Then add 7 to both sides: p = 15. Check: 3(15 − 7) = 3(8) = 24 ✓

94. B: 9y - Combine like terms: $10y - 4y + 3y = (10 - 4 + 3)y = 9y$. Work left to right: $10y - 4y = 6y$, then $6y + 3y = 9y$.

95. D: 192 - Substitute $m = 8$: $3m^2 = 3(8^2) = 3(64) = 192$. Remember to calculate the exponent first, then multiply by 3.

96. E: 20 - Solve $2x/5 = 8$ by multiplying both sides by 5: $2x = 40$. Then divide by 2: $x = 20$. Check: $2(20)/5 = 40/5 = 8$ ✓

97. C: 3 - Solve $5(n + 6) = 45$ by dividing both sides by 5 first: $n + 6 = 9$. Then subtract 6 from both sides: $n = 3$. Check: $5(3 + 6) = 5(9) = 45$ ✓

98. A: 19 - Substitute $a = 6$: $4a - 2a + 7 = 4(6) - 2(6) + 7 = 24 - 12 + 7 = 19$. Combine like terms first if possible: $(4a - 2a) + 7 = 2a + 7 = 2(6) + 7 = 12 + 7 = 19$.

99. B: 13 - Solve $7c = 91$ by dividing both sides by 7: $c = 91 \div 7 = 13$. Check: $7 \times 13 = 91$ ✓ Division is the inverse of multiplication.

100. D: 144 - Substitute values: $(x + y)^2 = (5 + 7)^2 = 12^2 = 144$. When squaring a sum, add first, then square the result. This is different from $x^2 + y^2$, which would be $25 + 49 = 74$.