

# PRACTICE EXAM 20: SIMULATION (50 QUESTIONS)

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**Time:** Two sessions of 60 minutes each (recommended)

**Total questions:** 50

**Calculator and EQAO Grade 9 formula sheet permitted.**

1. Solve for  $x$  in the equation  $7x - 4 = 3x + 20$ .

- A. 3
- B. 4
- C. 5
- D. 6

2. What is the value of  $4^3$ ?

- A. 12
- B. 16
- C. 64
- D. 81

3. A right triangle has legs measuring 7 cm and 24 cm. What is the length of the hypotenuse?

- A. 25 cm
- B. 23 cm
- C. 31 cm

D. 28 cm

4. Find the mean of the data set 5, 11, 14, 18, 22.

A. 11

B. 14

C. 18

D. 16

5. Solve for  $x$  in the equation  $(4x)/5 = 12$ .

A. 3

B. 60

C. 15

D. 9.6

6. A retailer buys a lamp for \$25 and marks it up by 40%. What is the selling price?

A. \$35.00

B. \$65.00

C. \$10.00

D. \$29.00

7. Given the relation  $f(x) = x^2 + 4x - 6$ , what is the value of  $f(-3)$ ?

A. 15

B. -9

C. 3

D. -15

8. What is the value of  $10^{-3}$ ?

A. -1000

B. 1000

C. -0.001

D. 0.001

9. A circle has a radius of 10 cm. What is its area? ( $A = \pi r^2$ , use  $\pi \approx 3.14$ .)

A. 31.4 cm<sup>2</sup>

B. 62.8 cm<sup>2</sup>

C. 100 cm<sup>2</sup>

D. 314 cm<sup>2</sup>

10. What is the slope of the line  $6x + 3y = 9$ ?

A. 6

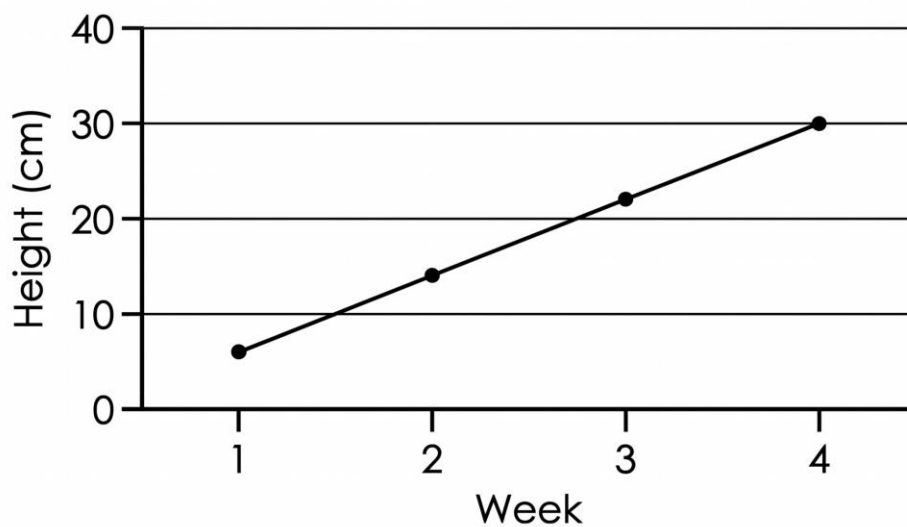
B. -2

C. 2

D. 3

11. The line graph below shows a plant's height over four weeks. By how many centimetres did the plant grow between Week 1 and Week 4?

Figure PQ-2:



- A. 24
- B. 30
- C. 36
- D. 8

12. Simplify the expression  $6(x + 2) - 3(2x - 1)$ .

- A.  $12x + 9$
- B. 9
- C. 15
- D.  $12x + 15$

13. Evaluate the expression  $24 \div 6 + 5 \times 2^2$ .

- A. 24
- B. 36
- C. 28

D. 18

14. Solve for  $x$  in the proportion  $6/9 = x/15$ .

A. 9

B. 10

C. 12

D. 8

15. A cylinder has a radius of 4 cm and a height of 7 cm. What is its volume, expressed in terms of  $\pi$ ? ( $V = \pi r^2 h$ .)

A.  $28\pi \text{ cm}^3$

B.  $56\pi \text{ cm}^3$

C.  $84\pi \text{ cm}^3$

D.  $112\pi \text{ cm}^3$

16. A sum of \$3,000 is invested at 5% simple interest per year for 2 years. What is the total amount, including principal and interest?

A. \$150

B. \$3,150

C. \$3,300

D. \$6,000

17. Expand and simplify the product  $(x - 8)(x + 3)$ .

A.  $x^2 - 24$

B.  $x^2 + 5x - 24$

C.  $x^2 - 11x - 24$

D.  $x^2 - 5x - 24$

18. Find the median of the data set 45, 31, 52, 38, 29.

A. 38

B. 45

C. 31

D. 39

19. Express the number 305,000 in scientific notation.

A.  $305 \times 10^3$

B.  $3.05 \times 10^4$

C.  $3.05 \times 10^5$

D.  $30.5 \times 10^4$

20. Solve the inequality  $-2x + 5 > 13$  for  $x$ .

A.  $x > -4$

B.  $x < -4$

C.  $x > 4$

D.  $x < 4$

21. Two angles are complementary. One of them measures  $28^\circ$ . What is the measure of the other angle?

A.  $152^\circ$

B.  $72^\circ$

- C.  $28^\circ$
- D.  $62^\circ$

22. The area of a triangle is given by  $A = \frac{1}{2}bh$ . Rearranged to solve for  $h$ , the formula becomes:

- A.  $h = A/(2b)$
- B.  $h = Ab/2$
- C.  $h = 2A/b$
- D.  $h = 2Ab$

23. A drawer contains 3 black socks and 5 white socks. Two socks are drawn without replacement. What is the probability that both are black?

- A.  $9/64$
- B.  $3/28$
- C.  $1/4$
- D.  $3/8$

24. A price rises from 80 to 100. What is the percent increase?

- A. 25%
- B. 20%
- C. 80%
- D. 125%

25. Solve the system  $y = 3x - 2$  and  $2x + y = 8$ . What is the value of  $x$ ?

- A. 2
- B. 4

C. 6

D. 1

26. A sum of \$4,000 is invested at 3% interest compounded annually. What is its value after 2 years?

A. \$4,120.00

B. \$4,240.00

C. \$4,200.00

D. \$4,243.60

27. Six more than three times a number is 27. What is the number?

A. 9

B. 11

C. 7

D. 5

28. Two angles of a triangle measure  $38^\circ$  and  $96^\circ$ . What is the measure of the third angle?

A.  $56^\circ$

B.  $46^\circ$

C.  $36^\circ$

D.  $134^\circ$

29. What is the least common multiple of 9 and 12?

A. 3

B. 108

- C. 36
- D. 21

30. Solve for  $x$  in the equation  $(x + 5)/2 = 9$ .

- A. 13
- B. 7
- C. 23
- D. 18

31. The mean of three numbers is 40. A fourth number is added and the mean becomes 45. What is the fourth number?

- A. 45
- B. 50
- C. 55
- D. 60

32. Factor the trinomial  $x^2 + 9x + 20$ .

- A.  $(x + 2)(x + 10)$
- B.  $(x + 4)(x + 5)$
- C.  $(x + 1)(x + 20)$
- D.  $(x - 4)(x - 5)$

33. Express the fraction  $7/20$  as a percentage.

- A. 35%
- B. 7%

- C. 70%
- D. 20%

34. An arithmetic sequence has a first term of 10 and a common difference of  $-3$ . What is the 6th term?

- A.  $-8$
- B. 5
- C.  $-5$
- D.  $-2$

35. A 17 m wire runs from the top of a pole to a point 8 m from its base on the ground. How tall is the pole?

- A. 9 m
- B. 15 m
- C. 19 m
- D. 12 m

36. A standard six-sided die is rolled once. What is the probability of rolling an even number?

- A.  $1/6$
- B.  $1/3$
- C.  $2/3$
- D.  $1/2$

37. Solve for  $x$  in the equation  $5(x - 1) = 3(x + 3)$ .

- A. 2
- B. 4

C. 5

D. 7

38. A \$60 shirt is discounted by 30%. What is the sale price, before tax?

A. \$42.00

B. \$18.00

C. \$48.00

D. \$78.00

39. Evaluate the expression  $|-7| + |-6| - |4|$ .

A. 17

B. 9

C. 5

D. 3

40. A relation gives the y-values 5, 8, 13, 20, 29 for  $x = 1, 2, 3, 4, 5$ . What is the value of y when  $x = 6$ ?

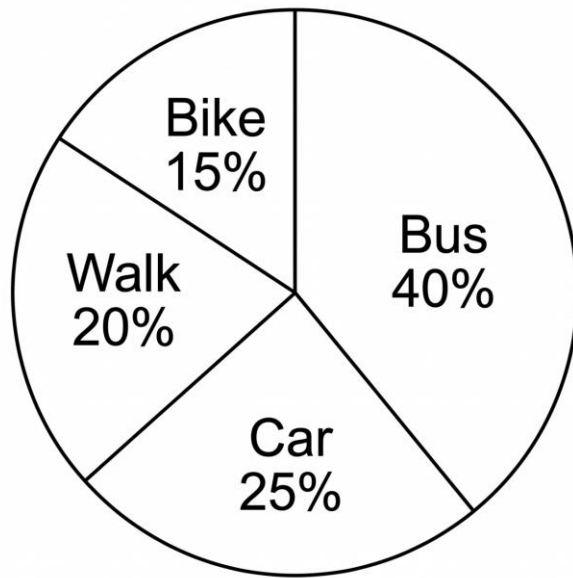
A. 36

B. 38

C. 40

D. 42

41. The circle graph below shows how 200 students travel to school. How many students walk?



- A. 20
- B. 40
- C. 50
- D. 80

42. Expand the product  $(2x - 3)(2x + 3)$ .

- A.  $4x^2 - 9$
- B.  $4x^2 + 9$
- C.  $4x^2 - 12x - 9$
- D.  $2x^2 - 9$

43. A rectangular prism measures 6 cm by 3 cm by 2 cm. What is its total surface area?

- A.  $36 \text{ cm}^2$
- B.  $48 \text{ cm}^2$
- C.  $72 \text{ cm}^2$

D.  $132 \text{ cm}^2$

44. A sum of \$700 is shared in the ratio 3 : 4. What is the larger share?

A. \$300

B. \$350

C. \$280

D. \$400

45. The parabola  $y = (x + 2)^2 - 7$  has its vertex at which point?

A.  $(2, -7)$

B.  $(-2, -7)$

C.  $(2, 7)$

D.  $(-2, 7)$

46. A data set is 64, 39, 71, 25, 58, 42. What is the range of the data set?

A. 32

B. 39

C. 71

D. 46

47. A 4 kg bag of flour costs \$6.00 and a 10 kg bag costs \$13.50. Which is the better value per kilogram?

A. 4 kg bag, at \$1.50/kg

B. both cost the same per kilogram

C. 10 kg bag, at \$1.35/kg

D. 4 kg bag, at \$1.35/kg

48. Devi earns \$2,800 per month and saves 22% of it. How much does she save each month?

A. \$616

B. \$280

C. \$220

D. \$2,184

49. What is the distance between the points (2, -1) and (8, 7)? (Use  $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ .)

A. 14

B. 10

C. 100

D. 8

50. Evaluate the expression  $(15 - 3) \div 4 + 2^3 \times 2$ .

A. 11

B. 24

C. 19

D. 35

## Practice Exam 20: Answer Key and Full Explanations

- 1. D** — Subtract  $3x$  from both sides:  $4x - 4 = 20$ . Adding 4 gives  $4x = 24$ , so  $x = 6$ . Collecting variables on one side reduces the equation to a single step.
- 2. C** — A power means repeated multiplication:  $4^3 = 4 \times 4 \times 4 = 64$ . The exponent counts how many times the base is used as a factor.
- 3. A** — Apply the Pythagorean theorem:  $c = \sqrt{7^2 + 24^2} = \sqrt{49 + 576} = \sqrt{625} = 25$  cm. The hypotenuse is the square root of the sum of the squared legs.
- 4. B** — Add the values and divide by the count:  $(5 + 11 + 14 + 18 + 22) \div 5 = 70 \div 5 = 14$ . The mean is the total divided by the number of values.
- 5. C** — Multiply both sides by 5:  $4x = 60$ . Dividing by 4 gives  $x = 15$ . Clearing the denominator first turns the equation into a one-step solve.
- 6. A** — A 40% markup means the selling price is 140% of the cost:  $25 \times 1.40 = \$35$ . Multiplying by 1 plus the markup rate combines cost and profit in one step.
- 7. B** — Substitute  $x = -3$  into  $f(x) = x^2 + 4x - 6$ :  $(-3)^2 + 4(-3) - 6 = 9 - 12 - 6 = -9$ . The squared term stays positive because a negative squared is positive.
- 8. D** — A negative exponent gives the reciprocal of the positive power:  $10^{-3} = 1/10^3 = 1/1,000 = 0.001$ . The result is a small positive decimal, not a negative number.
- 9. D** — Substitute into  $A = \pi r^2$ :  $3.14 \times 10^2 = 3.14 \times 100 = 314$  cm<sup>2</sup>. The radius is squared before multiplying by  $\pi$ .
- 10. B** — Rearrange into slope-intercept form:  $6x + 3y = 9$  gives  $3y = -6x + 9$ , so  $y = -2x + 3$ . The coefficient of  $x$  is the slope, which is  $-2$ .
- 11. A** — Read the plant's height at each end: Week 4 is 30 cm and Week 1 is 6 cm. The growth is  $30 - 6 = 24$  cm. Subtracting the two endpoint values gives the total change.
- 12. C** — Distribute both brackets:  $6(x + 2) = 6x + 12$  and  $-3(2x - 1) = -6x + 3$ . Combining like terms:  $6x - 6x + 12 + 3 = 15$ . The variable terms cancel, leaving a constant.
- 13. A** — Apply order of operations:  $24 \div 6 = 4$  and  $2^2 = 4$ , so  $5 \times 4 = 20$ . Then  $4 + 20 = 24$ . Division, the exponent, and multiplication come before the addition.
- 14. B** — Cross-multiply the proportion:  $9x = 6 \times 15 = 90$ , so  $x = 10$ . Cross-multiplication converts the proportion into a one-step equation.
- 15. D** — Substitute into  $V = \pi r^2 h$ :  $\pi(4^2)(7) = \pi(16)(7) = 112\pi$  cm<sup>3</sup>. The radius is squared before multiplying by the height.

- 16. C** — Simple interest is  $I = Prt = 3,000 \times 0.05 \times 2 = \$300$ . The total amount adds the interest to the principal:  $3,000 + 300 = \$3,300$ . The question asks for principal plus interest, not interest alone.
- 17. D** — Apply FOIL:  $x \cdot x = x^2$ ,  $x \cdot 3 = 3x$ ,  $-8 \cdot x = -8x$ ,  $-8 \cdot 3 = -24$ . Combining the middle terms gives  $x^2 - 5x - 24$ .
- 18. A** — Order the values: 29, 31, 38, 45, 52. With five values, the median is the middle (third) one, 38. The data must be sorted before locating the centre.
- 19. C** — Scientific notation needs a value between 1 and 10 times a power of ten. Moving the decimal five places left gives  $3.05 \times 10^5$ . The exponent equals the number of places the decimal moves.
- 20. B** — Subtract 5 from both sides:  $-2x > 8$ . Dividing by  $-2$  reverses the inequality sign:  $x < -4$ . Dividing by a negative number always flips the direction of the inequality.
- 21. D** — Complementary angles sum to  $90^\circ$ . Subtracting the known angle:  $90 - 28 = 62^\circ$ . The two angles together form a right angle.
- 22. C** — Multiply both sides of  $A = \frac{1}{2}bh$  by 2:  $2A = bh$ . Dividing by  $b$  isolates  $h$ :  $h = 2A/b$ . Each operation is reversed to undo the formula.
- 23. B** — The first black sock has probability  $\frac{3}{8}$ , and without replacement the second is  $\frac{2}{7}$ . Multiplying:  $(\frac{3}{8})(\frac{2}{7}) = \frac{6}{56} = \frac{3}{28}$ . The numbers shrink because one sock is removed.
- 24. A** — Percent increase is the change over the original:  $(100 - 80)/80 = 20/80 = 0.25 = 25\%$ . The original value, not the new one, is the denominator.
- 25. A** — Substitute  $y = 3x - 2$  into  $2x + y = 8$ :  $2x + 3x - 2 = 8$ , giving  $5x = 10$ , so  $x = 2$ . Substitution removes one variable so the equation can be solved.
- 26. D** — Compound interest uses  $A = P(1 + r)^n$ :  $4,000(1.03)^2 = 4,000 \times 1.0609 = \$4,243.60$ . The exponent of 2 reflects interest earned in each of the two years, including interest on interest.
- 27. C** — Translate into  $3n + 6 = 27$ . Subtracting 6 gives  $3n = 21$ , so  $n = 7$ . "Six more than three times" means the addition follows the multiplication.
- 28. B** — The angles of a triangle sum to  $180^\circ$ . Subtracting the two known angles:  $180 - (38 + 96) = 180 - 134 = 46^\circ$ . The three interior angles always total 180 degrees.
- 29. C** — Factor into primes:  $9 = 3^2$  and  $12 = 2^2 \times 3$ . The LCM takes the highest power of every prime present:  $2^2 \times 3^2 = 36$ . Using the larger exponent of each factor gives the least common multiple.
- 30. A** — Multiply both sides by 2:  $x + 5 = 18$ . Subtracting 5 gives  $x = 13$ . Clearing the denominator before isolating  $x$  keeps the steps simple.

- 31. D** — The first three numbers sum to  $3 \times 40 = 120$ , and all four sum to  $4 \times 45 = 180$ . The fourth number is  $180 - 120 = 60$ . Recovering totals from the means is the key step.
- 32. B** — Find two numbers that multiply to 20 and add to 9: 4 and 5. So  $x^2 + 9x + 20 = (x + 4)(x + 5)$ . The factor pair must satisfy both the product and the sum.
- 33. A** — Convert the fraction to a decimal then a percent:  $7 \div 20 = 0.35 = 35\%$ . Dividing the numerator by the denominator gives the decimal form before scaling to a percent.
- 34. C** — The  $n$ th term is  $t_n = t_1 + (n - 1)d$ :  $10 + (6 - 1)(-3) = 10 - 15 = -5$ . The negative common difference is subtracted five times, carrying the sequence below zero.
- 35. B** — The pole height is a leg, found with the Pythagorean theorem using the wire as the hypotenuse:  $\sqrt{(17^2 - 8^2)} = \sqrt{(289 - 64)} = \sqrt{225} = 15$  m. Subtracting before the square root solves for the vertical leg.
- 36. D** — Even numbers on a die are 2, 4, and 6 — three favourable outcomes out of six, giving  $3/6 = 1/2$ . The fraction is reduced to lowest terms.
- 37. D** — Expand both sides:  $5x - 5 = 3x + 9$ . Subtracting  $3x$  gives  $2x - 5 = 9$ , then  $2x = 14$ , so  $x = 7$ . Distributing each bracket before collecting like terms is the key step.
- 38. A** — A 30% discount means paying 70% of the price:  $60 \times 0.70 = \$42$ . Multiplying by the retained percentage gives the sale price directly.
- 39. B** — Absolute value gives distance from zero:  $|-7| = 7$ ,  $|-6| = 6$ ,  $|4| = 4$ . Then  $7 + 6 - 4 = 9$ . Each bar is evaluated before the addition and subtraction.
- 40. C** — The first differences are 3, 5, 7, 9, increasing by 2, which signals a quadratic relation. The next difference is 11, so the value at  $x = 6$  is  $29 + 11 = 40$ . The pattern follows  $y = x^2 + 4$ .
- 41. B** — Walking accounts for 20% of the 200 students:  $0.20 \times 200 = 40$ . Reading the sector percentage and applying it to the total gives the count.
- 42. A** — This is a difference of squares:  $(2x - 3)(2x + 3) = (2x)^2 - 3^2 = 4x^2 - 9$ . The middle terms cancel because the two factors are conjugates.
- 43. C** — Surface area of a rectangular prism is  $2(lw + lh + wh)$ :  $2(6 \times 3 + 6 \times 2 + 3 \times 2) = 2(18 + 12 + 6) = 2(36) = 72$  cm<sup>2</sup>. All six faces are counted in three matching pairs.
- 44. D** — The ratio 3 : 4 has  $3 + 4 = 7$  parts. The larger share is  $4/7$  of \$700:  $(4/7) \times 700 = \$400$ . Taking the fraction of the total finds the larger portion.
- 45. B** — In vertex form  $y = (x - h)^2 + k$ , the vertex is  $(h, k)$ . The bracket  $(x + 2)$  gives  $h = -2$ , and  $k = -7$ , so the vertex is  $(-2, -7)$ . The sign inside the bracket is reversed when reading  $h$ .

**46. D** — The range is the maximum minus the minimum:  $71 - 25 = 46$ . The range measures the full spread between the largest and smallest values.

**47. C** — Compare unit prices. The 4 kg bag:  $\$6.00 \div 4 = \$1.50/\text{kg}$ . The 10 kg bag:  $\$13.50 \div 10 = \$1.35/\text{kg}$ . The 10 kg bag is cheaper per kilogram, making it the better value.

**48. A** — Convert the percent to a decimal and multiply:  $0.22 \times 2,800 = \$616$ . Finding a percent of an amount is a single multiplication.

**49. B** — Apply the distance formula:  $\sqrt{(8 - 2)^2 + (7 - (-1))^2} = \sqrt{6^2 + 8^2} = \sqrt{36 + 64} = \sqrt{100} = 10$ . The horizontal and vertical changes form the legs of a right triangle.

**50. C** — Apply order of operations: the bracket first,  $(15 - 3) = 12$ , then divide:  $12 \div 4 = 3$ . Next the exponent  $2^3 = 8$  and the multiplication  $8 \times 2 = 16$ . Finally  $3 + 16 = 19$ . Brackets, exponents, division, and multiplication all come before the addition.