# PRACTICE EXAM 10: SIMULATION (50 QUESTIONS)

**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 $2x + 9 = 5x - 6$.

A. 3

B. −5

C. 5

D. 1

2. Evaluate the expression $7^0 + 2^{-2}$.

A. 0

B. 1

C. 9

D. 5/4

3. A right triangle has a hypotenuse of 13 cm and one leg of 5 cm. What is the length of the other leg?

A. 12 cm

B. 8 cm

C. 14 cm

D. 18 cm

4. The probability that it rains tomorrow is 0.35. What is the probability that it does not rain?

A. 0.35

B. 0.65

C. 0.50

D. 1.35

5. Solve for x in the equation $(2x)/5 = 6$.

A. 2.4

B. 12

C. 30

D. 15

6. A $90 pair of shoes is discounted by 30%. How much money is saved?

A. $30

B. $27

C. $63

D. $60

7. Simplify the expression $7x - 3 + 2x + 8$.

A. $9x - 5$

B. $14x + 5$

C. $9x + 5$

D. $5x + 5$

8. Express the number 4,200,000 in scientific notation.

A. $4.2 \times 10^6$

B. $42 \times 10^5$

C. $4.2 \times 10^5$

D. $4.2 \times 10^7$

9. A parallelogram has a base of 9 cm and a height of 6 cm. What is its area?

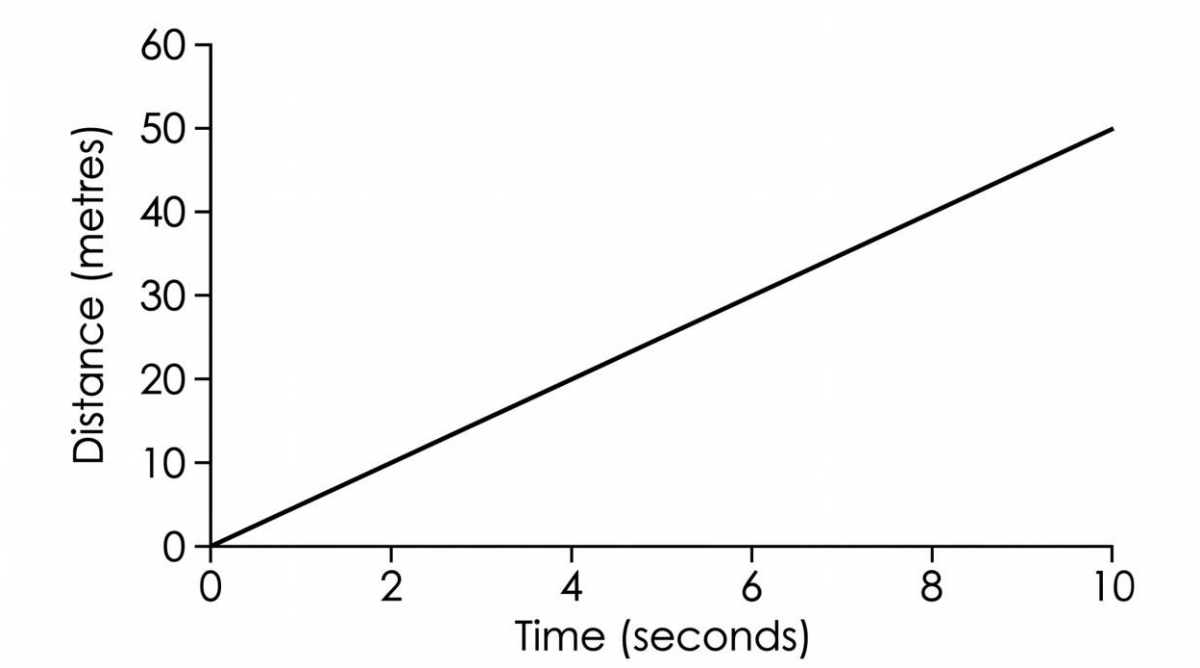
A. 54 $cm^2$

B. 30 $cm^2$

C. 27 $cm^2$

D. 15 $cm^2$

10. Look at the distance-time graph below. What is the speed of the object during the trip?




A. 50 m/s

B. 10 m/s

C. 5 m/s

D. 2 m/s

11. Find the median of the data set 14, 9, 21, 17, 12.

A. 12

B. 14

C. 17

D. 14.6

12. A number is multiplied by 4 and then 7 is added, giving a result of 31. What is the number?

A. 9.5

B. 5

C. 8

D. 6

13. Evaluate the expression $(3/5) \div (9/10)$.

A. 27/50

B. 6/5

C. 2/3

D. 3/2

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

A. 10

B. 14

C. 11

D. 22

15. A cylinder has a radius of 3 cm and a height of 10 cm. What is its total surface area, to the nearest whole number? ($SA = 2\pi r^2 + 2\pi rh$, use $\pi \approx 3.14$.)

A. 188 $cm^2$

B. 207 $cm^2$

C. 283 $cm^2$

D. 245 $cm^2$

16. A 2 kg bag of rice costs $7.00 and a 5 kg bag costs $16.00. Which is the better value, and what is its unit price?

A. 2 kg bag, at $3.20 per kg

B. 5 kg bag, at $3.20 per kg

C. 5 kg bag, at $3.50 per kg

D. both bags cost the same per kg

17. Solve the inequality $2x + 5 > 3x - 4$ for x.

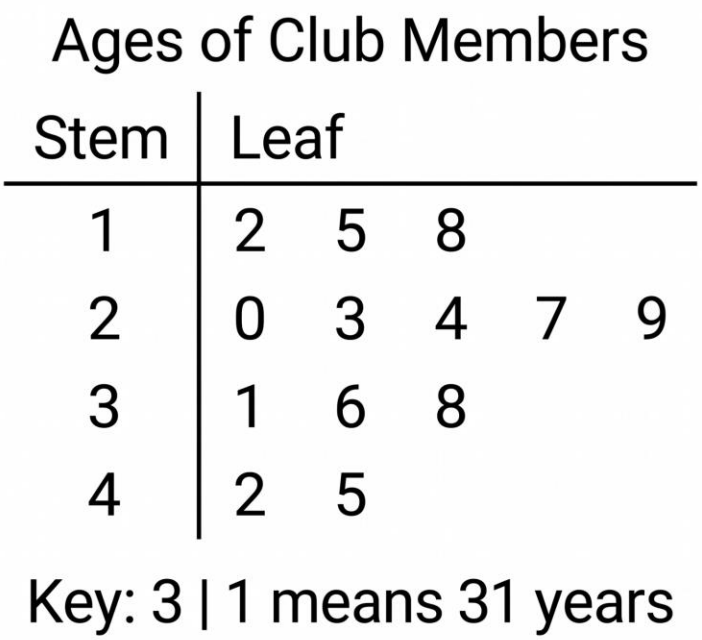
A. $x < 9$

B. $x > 9$

C. $x < -9$

D. $x > -9$

18. Look at the stem-and-leaf plot below showing the ages of club members. How many members are at least 30 years old?




A. 3

B. 2

C. 8

D. 5

19. After a 25% increase, a salary is $50,000. What was the original salary?

A. $37,500

B. $40,000

C. $62,500

D. $45,000

20. Expand and simplify the expression $2(3x - 1) + 4(x + 2)$.

A. $10x - 6$

B. $7x + 6$

C. $10x + 6$

D. $10x + 1$

21. A cone has a radius of 3 cm and a height of 4 cm. What is its volume, expressed in terms of $\pi$? ($V = (1/3)\pi r^2 h$.)

A. $36\pi$ cm³

B. $9\pi$ cm³

C. $4\pi$ cm³

D. $12\pi$ cm³

22. What is the slope of the line $2x + 3y = 12$?

A. 2/3

B. 2

C. −2/3

D. −3/2

23. The mean of five numbers is 20. Four of the numbers are 15, 22, 18, and 25. What is the fifth number?

A. 20

B. 25

C. 18

D. 22

24. A recipe for 4 people needs 300 g of flour. How much flour is needed for 6 people?

A. 200 g

B. 450 g

C. 500 g

D. 400 g

25. A jar contains nickels and dimes totalling 20 coins worth $1.65. How many dimes are in the jar? (A nickel is $0.05 and a dime is $0.10.)

A. 7

B. 10

C. 8

D. 13

26. A $1,000 deposit earns 6% interest compounded annually. What is its value after 3 years, to the nearest cent?

A. $1,191.02

B. $1,180.00

C. $1,191.00

D. $1,260.00

27. The length of a rectangle is 3 cm more than its width, and the perimeter is 26 cm. What is the width of the rectangle?

A. 8 cm

B. 5 cm

C. 6.5 cm

D. 10 cm

28. Two complementary angles are such that one is 4 times the size of the other. What is the measure of the smaller angle?

A. 72°

B. 30°

C. 18°

D. 22.5°

29. A quantity increases by 10%, then increases by another 10%. What is the overall percent increase?

A. 100%

B. 110%

C. 21%

D. 20%

30. The formula $C = 2\pi r$ gives the circumference of a circle. Rearranged to solve for r, the formula becomes:

A. $r = 2\pi C$

B. $r = C - 2\pi$

C. $r = 2\pi / C$

D. $r = C/(2\pi)$

31. A number is chosen at random from the integers 1 to 20. What is the probability that it is a multiple of 5?

A. 1/4

B. 1/5

C. 1/10

D. 4/5

32. What is the x-intercept of the line $y = 2x - 8$?

A. (4, 0)

B. (0, −8)

C. (−4, 0)

D. (8, 0)

33. What is the greatest common factor of 36 and 48?

A. 6

B. 12

C. 144

D. 4

34. A relation has the y-values 2, 5, 10, 17, 26 for x = 1, 2, 3, 4, 5. What is the value of y when x = 6?

A. 30

B. 35

C. 40

D. 37

35. A boat travels 9 km east and then 12 km north. How far is the boat from its starting point in a straight line?

A. 15 km

B. 21 km

C. 11 km

D. 18 km

36. Which type of graph is most appropriate for showing how a single quantity changes continuously over time?

A. A circle (pie) graph

B. A bar graph

C. A line graph

D. A stem-and-leaf plot

37. Solve for x in the equation $(x + 4)/2 = x - 1$.

A. 2

B. 6

C. 3

D. −6

38. A total bill including 13% HST is $113. What was the price before tax?

A. $98.31

B. $113.13

C. $100.00

D. $87.00

39. What is the value of $\sqrt{144} + \sqrt{25}$?

A. 169

B. 13

C. 7

D. 17

40. The cost C of apples varies directly with the mass m. If 3 kg of apples costs $9, what is the cost of 7 kg?

A. $21

B. $18

C. $27

D. $63

41. A data set is 22, 25, 24, 23, 90. Which value is an outlier?

A. 22

B. 24

C. 90

D. 25

42. Factor the expression $x^2 - 49$ completely.

A. $(x - 7)(x + 7)$

B. $(x - 7)^2$

C. $(x + 7)^2$

D. $(x - 49)(x + 1)$

43. Two similar rectangles have a side scale factor of 1 : 3. If the smaller rectangle has an area of 8 $cm^2$, what is the area of the larger rectangle?

A. 24 $cm^2$

B. 72 $cm^2$

C. 64 $cm^2$

D. 27 $cm^2$

44. Evaluate the expression $3/4 + 1/2 \times 2/3$.

A. 5/6

B. 7/12

C. 11/12

D. 13/12

45. The parabola $y = (x + 3)^2 - 5$ has its vertex at which point?

A. (3, −5)

B. (−3, −5)

C. (3, 5)

D. (−3, 5)

46. To find the average daily screen time of all students, a teacher surveys only the members of the computer club. What is the main problem with this sample?

A. The sample is too large to analyse

B. The survey asked about screen time

C. The sample does not represent all students

D. The students were chosen at random

47. Jordan earns $2,400 per month, spends 80% on expenses, and saves the rest. How much is saved over one year?

A. $5,760

B. $480

C. $4,800

D. $23,040

48. A rectangular tank has a base area of 1,500 $cm^2$ and holds 9,000 $cm^3$ of water when full. What is the height of the tank?

A. 1.5 cm

B. 15 cm

C. 60 cm

D. 6 cm

49. A $30,000 vehicle depreciates 10% per year. What is its value at the end of 2 years?

A. $24,300

B. $24,000

C. $27,000

D. $6,000

50. Evaluate the expression $-5 \times (3 - 8) + 2^3$.

A. 17

B. −17

C. 33

D. 23

## Practice Exam 10: Answer Key and Full Explanations

**1. C** — Collect variables on one side and constants on the other: adding 6 and subtracting 2x gives 15 = 3x, so x = 5. Moving terms across the equals sign reverses their operation.

**2. D** — Any non-zero base to the power zero equals 1, so $7^0 = 1$. A negative exponent gives a reciprocal: $2^{-2} = 1/4$. Adding: 1 + 1/4 = 5/4. The two exponent rules apply independently to each term.

**3. A** — Rearrange the Pythagorean theorem to find a leg: $\sqrt{(13^2 - 5^2)} = \sqrt{(169 - 25)} = \sqrt{144} = 12$ cm. Subtracting before the square root is required when solving for a leg rather than the hypotenuse.

**4. B** — The probabilities of an event and its complement sum to 1. The chance of no rain is 1 − 0.35 = 0.65. Every outcome must fall into one of the two cases, so they total 1.

**5. D** — Multiply both sides by 5 to clear the fraction: 2x = 30. Dividing by 2 gives x = 15. Clearing the denominator first simplifies the equation.

**6. B** — The saving is the discount percentage of the price: 0.30 × 90 = $27. The question asks for the amount saved, not the final price.

**7. C** — Combine like terms by grouping the x-terms and the constants: 7x + 2x = 9x and −3 + 8 = 5, giving 9x + 5. Only terms with the same variable part can be combined.

**8. A** — Scientific notation needs a value between 1 and 10 times a power of ten. Moving the decimal six places left gives $4.2 \times 10^6$. A large number takes a positive exponent equal to the number of places moved.

**9. A** — Area of a parallelogram is base times perpendicular height: 9 × 6 = 54 cm². The slant side is not used; only the perpendicular height matters.

**10. C** — On a distance-time graph, speed is the slope. The line rises 50 m over 10 s, so the speed is 50 ÷ 10 = 5 m/s. A straight line means a constant speed throughout.

**11. B** — Order the values first: 9, 12, 14, 17, 21. With five values, the median is the middle (third) value, 14. The data must be sorted before locating the centre.

**12. D** — Model the steps as $4n + 7 = 31$. Subtracting 7 gives $4n = 24$, so $n = 6$. The operations are undone in reverse order to isolate the number.

**13. C** — Dividing by a fraction means multiplying by its reciprocal: $(3/5) \times (10/9) = 30/45$. Simplifying gives $2/3$. Flipping the second fraction converts division to multiplication.

**14. A** — Substitute $x = 2$ into $f(x) = 3x^2 - x$: $3(2^2) - 2 = 3(4) - 2 = 12 - 2 = 10$. The squared term is evaluated before subtracting.

**15. D** — Substitute into $SA = 2\pi r^2 + 2\pi rh$: $2(3.14)(9) + 2(3.14)(3)(10) = 56.52 + 188.4 = 244.92 \approx 245$ cm². The two circular ends and the curved surface are all included.

**16. B** — Compare unit prices per kilogram. The 2 kg bag: \$7.00 ÷ 2 = \$3.50/kg. The 5 kg bag: \$16.00 ÷ 5 = \$3.20/kg. The 5 kg bag is cheaper per kilogram, making it the better value.

**17. A** — Subtract $2x$ from both sides: $5 > x - 4$. Adding 4 gives $9 > x$, which is $x < 9$. No division by a negative occurs, so the inequality direction stays the same.

**18. D** — Members at least 30 are in the stem-3 row (31, 36, 38 — three leaves) and the stem-4 row (42, 45 — two leaves). Adding: $3 + 2 = 5$ members. Each leaf represents one data value.

**19. B** — A 25% increase means the salary is 125% of the original: $1.25 \times \text{original} = 50{,}000$. Dividing gives original = 50,000 ÷ 1.25 = \$40,000. Working backward from the increased amount recovers the start.

**20. C** — Distribute both brackets: $2(3x - 1) = 6x - 2$ and $4(x + 2) = 4x + 8$. Combining: $6x + 4x - 2 + 8 = 10x + 6$. Like terms are gathered after expanding.

**21. D** — Substitute into $V = (1/3)\pi r^2 h$: $(1/3)\pi(3^2)(4) = (1/3)\pi(36) = 12\pi$ cm³. The radius is squared before applying the one-third factor.

**22. C** — Rearrange into slope-intercept form: $3y = -2x + 12$, so $y = -(2/3)x + 4$. The coefficient of $x$ is the slope, which is $-2/3$. Solving for $y$ isolates the slope.

**23. A** — The five numbers sum to $5 \times 20 = 100$. The four known values total $15 + 22 + 18 + 25 = 80$, so the fifth is $100 - 80 = 20$. Finding the total from the mean is the key first step.

**24. B** — Scale the flour by the ratio of people: $300 \times (6/4) = 300 \times 1.5 = 450$ g. The amount grows in direct proportion to the number of people.

**25. D** — Let $d$ be dimes and $20 - d$ nickels: $0.10d + 0.05(20 - d) = 1.65$. This becomes $0.05d + 1 = 1.65$, so $0.05d = 0.65$ and $d = 13$. Expressing one coin count in terms of the other reduces it to a single equation.

**26. A** — Compound interest uses $A = P(1 + r)^n$: $1{,}000(1.06)^3 = 1{,}000 \times 1.191016 = \$1{,}191.02$. The exponent of 3 reflects interest compounding in each of the three years.

**27. B** — Let the width be w, so the length is w + 3. The perimeter equation is $2(w + 3) + 2w = 26$, which gives $4w + 6 = 26$, so $4w = 20$ and $w = 5$ cm. Both length and width are written in terms of one variable.

**28. C** — Complementary angles sum to 90°. Letting the smaller be x and the larger 4x: $x + 4x = 90$, so $5x = 90$ and $x = 18°$. The smaller angle is the single x.

**29. C** — Successive increases multiply: $1.10 \times 1.10 = 1.21$, which is a 21% overall increase. The two increases cannot simply be added to 20%, since the second applies to the already-larger amount.

**30. D** — Divide both sides of $C = 2\pi r$ by $2\pi$ to isolate r: $r = C/(2\pi)$. Dividing by the full coefficient of r reverses the multiplication.

**31. B** — The multiples of 5 from 1 to 20 are 5, 10, 15, and 20 — four favourable outcomes out of 20. The probability is 4/20, which simplifies to 1/5. The fraction must be reduced to lowest terms.

**32. A** — The x-intercept occurs where $y = 0$: $0 = 2x - 8$, so $2x = 8$ and $x = 4$, giving the point (4, 0). The x-intercept always has a y-coordinate of zero.

**33. B** — Factor into primes: $36 = 2^2 \times 3^2$ and $48 = 2^4 \times 3$. The GCF takes the lowest power of each shared prime: $2^2 \times 3 = 12$. Using the smaller exponent of each common factor gives the greatest common factor.

**34. D** — 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 $26 + 11 = 37$. The pattern follows $y = x^2 + 1$.

**35. A** — The straight-line distance is the hypotenuse of a right triangle with legs 9 km and 12 km: $\sqrt{(9^2 + 12^2)} = \sqrt{(81 + 144)} = \sqrt{225} = 15$ km. The east and north legs meet at a right angle.

**36. C** — A line graph connects data points over a continuous variable like time, showing trends and rates of change. Bar graphs compare categories, pie graphs show parts of a whole, and stem-and-leaf plots display distributions. Continuous change over time is best shown by a line.

**37. B** — Multiply both sides by 2 to clear the fraction: $x + 4 = 2(x - 1) = 2x - 2$. Subtracting x and adding 2 gives $x = 6$. Clearing the denominator first removes the fraction.

**38. C** — The total is 113% of the pre-tax price: $1.13 \times \text{price} = 113$. Dividing gives price $= 113 \div 1.13 =$ \$100.00. Dividing by 1 plus the tax rate recovers the original amount.

**39. D** — Evaluate each root separately: $\sqrt{144} = 12$ and $\sqrt{25} = 5$. Adding: $12 + 5 = 17$. Both are perfect squares, giving exact whole-number roots.

**40. A** — Direct variation means cost = k × mass. Finding the constant: $k = 9 \div 3 =$ \$3 per kg. Then $3 \times 7 =$ \$21. The constant rate stays fixed across all masses.

**41. C** — An outlier is a value far from the rest of the data. The values cluster in the low twenties, but 90 sits far above them, making it the outlier. Distance from the main group identifies an outlier.

**42. A** — This is a difference of squares: $x^2 - 49 = x^2 - 7^2 = (x - 7)(x + 7)$. The two factors are the sum and difference of the square roots of each term.

**43. B** — When linear dimensions scale by a factor, area scales by the square of that factor. With a scale factor of 3, the area scales by $3^2 = 9$: $8 \times 9 = 72$ cm². Area is two-dimensional, so the scale factor is squared.

**44. D** — Order of operations requires the multiplication first: $(1/2)(2/3) = 2/6 = 1/3$. Then add to 3/4 using the common denominator 12: $9/12 + 4/12 = 13/12$. Multiplication is completed before addition.

**45. B** — In vertex form $y = (x - h)^2 + k$, the vertex is $(h, k)$. Here the bracket is $(x + 3)$, so $h = -3$, and $k = -5$, giving the vertex $(-3, -5)$. The sign inside the bracket is reversed when reading h.

**46. C** — Computer club members are not a cross-section of all students, so their screen-time habits may differ from the wider population. This sampling bias makes the estimate unreliable. A representative sample must include all types of students.

**47. A** — Jordan saves $100\% - 80\% = 20\%$ of \$2,400, which is $0.20 \times 2{,}400 = \$480$ per month. Over a year: $480 \times 12 = \$5{,}760$. The monthly saving must be multiplied by twelve for the annual total.

**48. D** — Volume equals base area times height, so height is volume divided by base area: $9{,}000 \div 1{,}500 = 6$ cm. Rearranging the volume relationship isolates the height.

**49. A** — Losing 10% per year means retaining 90% annually, so after two years: $30{,}000 \times (0.90)^2 = 30{,}000 \times 0.81 = \$24{,}300$. The depreciation factor compounds downward each year.

**50. C** — Apply order of operations: the bracket first, $(3 - 8) = -5$, then $-5 \times (-5) = 25$ and $2^3 = 8$. Finally $25 + 8 = 33$. Multiplying two negatives gives a positive result.