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Mathematics 10 Option 1
Final Exam Multiple Choice and Numerical Response

Record your answers on the answer sheet provided.

Many of the tools and equipment used in everyday life and in recreational activities were designed using mathematical measurements and calculations. Apply your knowledge and skills of mathematics to solve problems related to tools and equipment.

Use this information to answer #1–3.

Jay's family is planning a fire drill at home. Jay decides to buy a ladder that can reach the second storey window. The window is 25 ft above ground. There are shrubs at the base of the house.

1. If the foot of the ladder is 10 ft from the house, what is the length of the ladder to the nearest foot?

A 15 ft **B** 20 ft **C** 27 ft **D** 35 ft

Numerical Response

2. What angle does the ladder leaning against the wall form with the ground, to the nearest degree?

3. The height of the attic is 18 ft and the pitch of the roof is $\frac{3}{4}$. What is the length of side x on the roof?

Note: The pitch refers to the slope of the roof.

A 20 ft **B** 24 ft **C** 30 ft **D** 42 ft

4. What is an appropriate referent for measuring the length and width of a bucket on a bulldozer?

A a ball of string **B** a paper clip **C** a pen **D** a shoe lace

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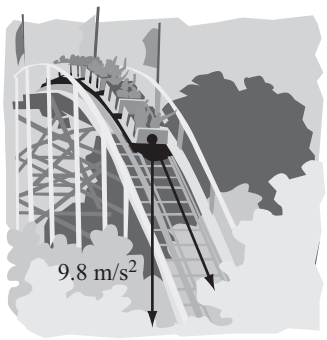
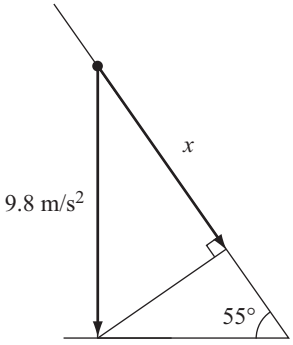
Use this information to answer #5.

The ordinary acceleration due to gravity, if you were to fall straight down, is 9.8 m/s². This means your speed will increase with every second. A roller coaster is designed to let you fall more slowly, to protect you from injury. Designers slow acceleration by building a ramp to slow down the ride.





5. What is the acceleration down the ramp, x, to the nearest tenth?

A 10.6 m/s² **B** 8 m/s² **C** 6.9 m/s² **D** 5.6 m/s²

Use this information to answer #6–7.

An amusement park ride called Pendulum has riders suspended from a cable swinging back and forth. The formula $V = \sqrt{2gh}$ can be used to represent the speed of the pendulum. In the formula, V is the speed in metres per second, g is the acceleration due to gravity at 9.8 m/s², and h is the height of the cable, in metres.

6. What is the approximate speed of the pendulum if the cable is 43 m long?

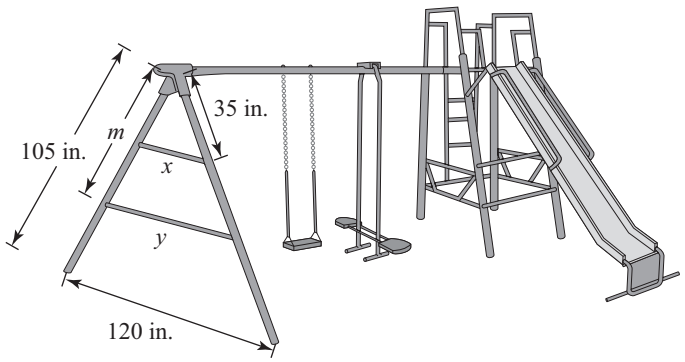
A 12 m/s **B** 20 m/s **C** 25 m/s **D** 30 m/s

7. Suppose a rider's speed is 29.7 m/s. What is this speed expressed in kilometres per hour?

A 107 km/h **B** 100 km/h **C** 78 km/h **D** 70 km/h

Use this information to answer #8–9.

A community installs new playground equipment in the park. The play structure has a triangular side brace with a cross bar, x.



8. What is the length of the cross bar, x?

A 3′2″ **B** $3\frac{1}{4}'$ **C** 3.3′ **D** 3′4″

9. The work crew decides to add a second cross bar, $y = 48$ in., to support the structure of the swing set. What is the length of m?

A $29\frac{1}{6}$ in. **B** 42 in. **C** $54\frac{5}{7}$ in. **D** 63 in.

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10. The work crew needs to install eight nonbreakable lights on the playground. Each light requires a minimum of 1200 mm of wiring. Approximately how many feet of wiring is needed?

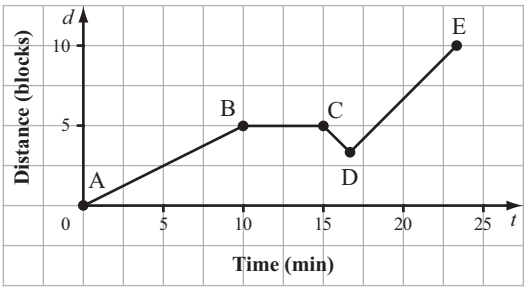
A 3.9 ft **B** 31.5 ft **C** 315 ft **D** 378 ft

11. The work crew purchases 10 L of drinking water at $2.89/L. What is the approximate cost per person, assuming that there are 8 workers who each drink 1200 mL of water?

A $3.00 **B** $3.25 **C** $3.47 **D** $3.61

Use this information to answer #12–13.

Maylin walks along a pathway in a park. The graph shows the distance, d, she walked from point A to point E, as a function of time, t.



12. When was Maylin's average walking speed the fastest?

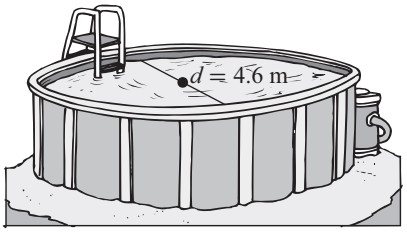
A from A to B **B** from B to C **C** from C to D **D** from D to E

13. Which range represents Maylin's walk?

A $0 \leq d \leq 5$ **B** $0 \leq d \leq 10$ **C** $0 \leq d \leq 17$ **D** $0 \leq d \leq 23$

Use this information to answer #14–16.

A pool manufacturer makes swimming pools that are 4.6 m in diameter.



14. What is the height of the sides of the pool if its capacity is 18 280 L? **Hint:** 1000 L = 1 m^3.

A 1100 m **B** 1100 dm **C** 1100 cm **D** 1100 mm

Numerical Response

15. A manufacturer designs a similar pool with a diameter of 15 ft. The pool's sides are 3.5 ft high. The company is getting estimates for the sheet metal that forms the sidewall of the pool. What is the minimum amount of sheet metal needed for the sidewall, to the nearest square foot?

16. The pump on the pool filters water at approximately 0.063 m^3/h. What is this volume expressed to the nearest cubic foot per hour?

A 1 ft^3/h **B** 2 ft^3/h **C** 3 ft^3/h **D** 4 ft^3/h

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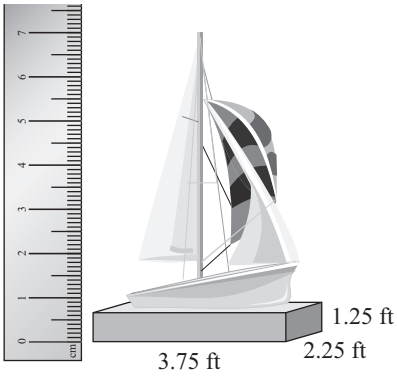
Use this information to answer #17–18.

A sculpture of a sailboat is installed on a playground.



17. If 0.5 cm = 6 in., what is the height of the sculpture?

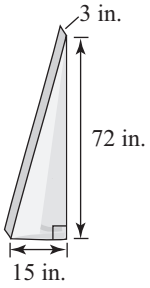
A 8.4 in. **B** 42 in. **C** 7 ft **D** 84 ft

18. The base of the sculpture is shaped like a right prism. How much stainless steel is needed for the top and the sides of the base, to the nearest tenth of a square foot?

A 10.6 ft.^{2} **B** 18.8 ft^2 **C** 21.1 ft^2 **D** 22.5 ft^2

Use this information to answer #19.

A view of a sail on the sailboat is shown.



Numerical Response

19. What is the volume of the sail?

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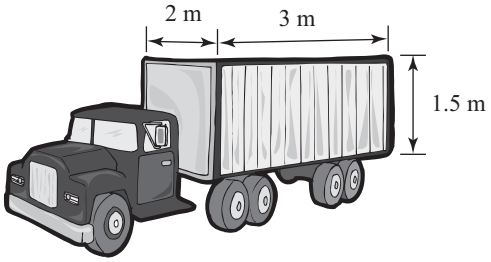
Use this information to answer #20.

A grain truck hauls grain from a farm to a grain elevator. The grain box has no top.

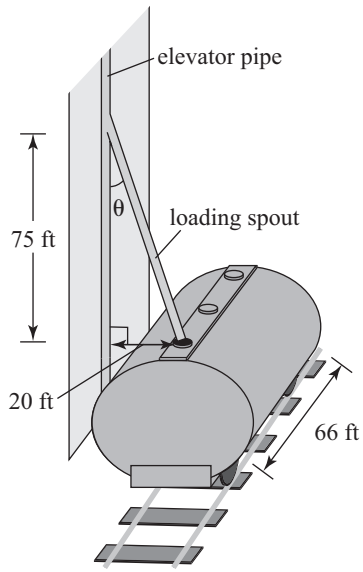


20. What is the surface area of the grain box, to the nearest square metre?

A 7 m^2 **B** 9 m^2 **C** 18 m^2 **D** 21 m^2

Use this information to answer #21–23.

The grain that farmers deliver to a grain elevator is transported by railcars to terminal ports. To load the railcar, the grain is dropped into a railcar's loading spout.



21. How long is the loading spout?

A 45 ft **B** 60 ft **C** 78 ft **D** 105 ft

Numerical Response

22. What is the angle, θ, between the loading spout and the elevator pipe, to the nearest tenth of a degree?

23. Assume that the rail car is in the shape of a cylinder and has a diameter of 14 ft. What is its volume, to the nearest cubic foot?

A 40 295 ft^3 **B** 10 160 ft^3 **C** 2900 ft^3 **D** 925 ft^3

24. A rectangular storage area in the grain elevator can be represented by the expression $3x^2 + 2x - 5$. Which expression represents the dimensions of the storage area?

A $(x + 5)(3x + 1)$ **B** $(x + 5)(3x - 1)$

C $(3x + 5)(x - 1)$ **D** $(3x - 5)(x + 1)$

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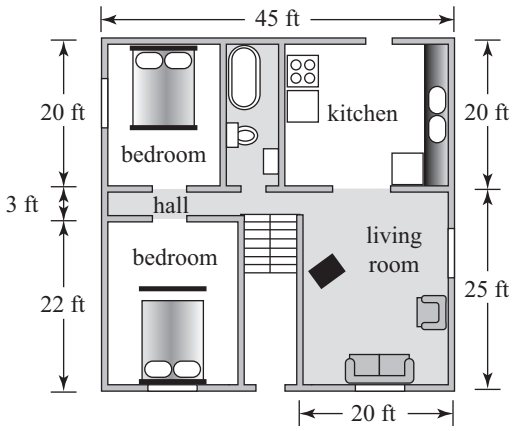
Use this information to answer #25–26.

A flooring company plans to install carpet in the hall and the living room.



25. How much carpet is needed, to the nearest square foot?

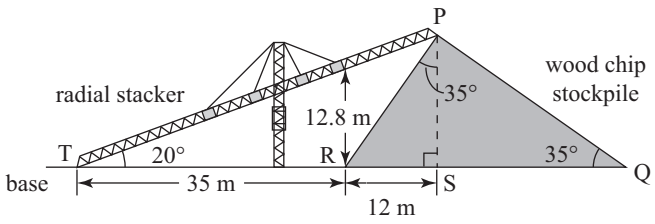
A 160 ft^2 **B** 575 ft^2 **C** 635 ft^2 **D** 812 ft^2

Numerical Response

26. If it costs approximately $5225 to carpet the hall and the living room, what is the cost per square foot, to the nearest cent?

Use this information to answer #27–28.

A radial stacker moves wood chips to a wood chip stockpile.



Numerical Response

27. What is the height of the wood pile, to the nearest tenth of a metre?

28. The base of the radial stacker, T, needs to be located no more than 60 m from the far side of the stockpile, Q. Which statement about the position of the base shown is correct?

A The base is within the range by approximately 5 m.

B The base is within the range by approximately 10 m.

C The base is beyond the range by approximately 5 m.

D The base is beyond the range by approximately 10 m.

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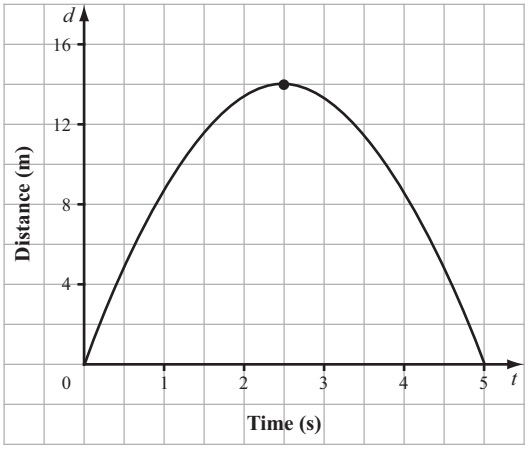
Use this information to answer #29.

The graph shows the path of a soccer ball after it is kicked into the air.



29. Which statement is true?

A The ball reaches a maximum height at 2.5 s.

B The ball reaches a maximum height at 5 s.

C The ball reaches a minimum height at 2.5 s.

D The ball reaches a minimum height at 5 s.

Connections

Many of the concepts that you study in mathematics are related and can help you solve different kinds of problems. Connect the concepts and skills you have learned to solve problems.

30. Diana simplified $(x + a)(x + b)$, where $a < 0$, $b > 0$, and $a + b < 0$, to the form $x^2 + mx + n$. Which statement about m and n is true?

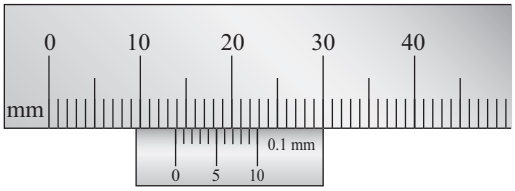
A $m < 0$ and $n > 0$

B $m < 0$ and $n < 0$

C $m > 0$ and $n < 0$

D $m > 0$ and $n > 0$

Use the SI caliper to answer #31.



Numerical Response

31. What is the reading on the caliper, to the nearest tenth of a millimetre?

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32. A right pyramid has a square base that measures 30 m by 30 m. If its volume is 13 500 m^3, what is the height of the pyramid?

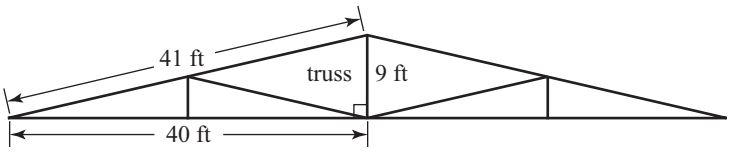
A 15 cm **B** 30 cm **C** 45 cm **D** 60 cm

33. Dan pours oil into a cylindrical tube that has diameter 5 cm and height 11 cm until the tube is three quarters full. What is the volume of the oil, to the nearest cubic centimetre?

A 81 cm^3 **B** 121 cm^3 **C** 162 cm^3 **D** 216 cm^3

Use this information to answer #34.

The pitch of the roof shown is supported by a truss. The pitch refers to the slope of the roof.

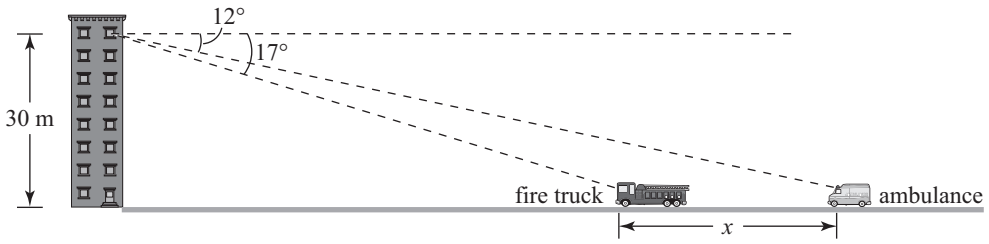


34. What is the pitch of the roof?

A $\frac{9}{41}$ **B** $\frac{9}{40}$ **C** $\frac{40}{9}$ **D** $\frac{41}{9}$

Use this information to answer #35.

From the window in her office, Zara sees a fire truck and an ambulance on the street.



35. How far apart are the ambulance and the fire truck?

A 98 m **B** 43 m **C** 41 m **D** 30 m

36. A gardener needs to determine the volume of water that a length of hose can handle. Which tool should the gardener use to measure the outside and the inside diameter of the hose?

A caliper **B** measuring tape **C** micrometer **D** trundle wheel

Use this information to answer #37–38.

The prime factorization of a number, x, is $2 \times 2 \times 3 \times 3 \times 2 \times 3 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$.

Numerical Response

37. What is the cube root of x?

38. What is the value of x?

A 13 824 **B** 1728 **C** 576 **D** 118

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Use this information to answer #39.

During the Ice Tour at the Columbia Icefield, in Alberta, tourists ride in a vehicle designed to travel on the glacier. The vehicle has to maneuver several steep drops during the tour on the glacier.

39. Which expression can be used to determine the angle that the surface of the glacier makes with the horizontal?

A $\sin\frac{16}{100}$ **B** $\sin^{-1}\frac{16}{100}$ **C** $\tan\frac{16}{100}$ **D** $\tan^{-1}\frac{16}{100}$

40. Which diagram shows the process used to identify the least common multiple of a number?

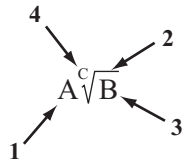
A
2 3 6
2 3 4 6

B
2 3 5 6 10 30
3 7 21

C
2 3 6 9 12 15 18 21
2 3 4 6 12 18 24

D
8 16 24
6 12 18 24

Use this information to answer #41.



Numerical Response

41. Using the numerals 1, 2, 3, and 4, list the parts of the radical in the following order: the radicand, the integer coefficient, the root symbol, and the index.

42. What is the value of A in the form $A\sqrt{B}$, when $2\sqrt{98}$ is simplified?

A 2 **B** 9 **C** 10 **D** 14

43. In simplified form, what is the integer coefficient of $3\sqrt{8} + 2\sqrt{18} - 4\sqrt{98}$?

A 16 **B** 1 **C** –1 **D** –16

Numerical Response

44. What is the value of B in the form $A\sqrt{B}$, when $\sqrt{75} + \sqrt{48} - \sqrt{12}$ is simplified?

45. Consider the numbers $0.\overline{45}$, –3, and $\sqrt{80}$. Which numbers are rational numbers?

A $0.\overline{45}$ only **B** –3 only **C** $0.\overline{45}$ and –3 **D** $0.\overline{45}$, –3, and $\sqrt{80}$

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Use this information to answer #46–47.

A relation is presented in the table of values.

x	2	3	4	5	6	7	8
y	5	7	9	11	13	15	17

Numerical Response

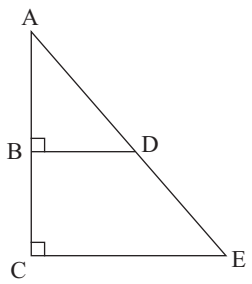
46. What is the value of y when $x = 10$?

47. Which statement about the slope, m, and the y-intercept, b, is true for this relation?

A $m = 1$ and $b = 1$ **B** $m = 2$ and $b = 1$

C $m = -1$ and $b = -1$ **D** $m = -2$ and $b = -2$

Use this diagram to answer #48.



48. Assume that the triangles are similar. Which ratio is correct?

A $\frac{AB}{BC} = \frac{AD}{DE}$ **B** $\frac{AB}{AC} = \frac{AE}{CE}$ **C** $\frac{AD}{DB} = \frac{AE}{AC}$ **D** $\frac{BD}{CE} = \frac{AD}{AE}$

Numerical Response

49. Use $x = 3$ to verify that $(x + 7)(2x - 3)$ are factors of $2x^2 + 11x - 21$. What answer do you obtain?

Numerical Response

50. If $\cos \theta = 0.87$, what is the measure of θ, to the nearest tenth of a degree?

51. What is the rate of change for the line $y = -3x - 2$?

A -3 **B** -2 **C** 2 **D** 3

52. What is the equation of the line through (0, 5) and (−20, 0)?

A $y = \frac{1}{4}x - 5$ **B** $y = \frac{1}{4}x + 5$ **C** $y = \frac{1}{4}x + 20$ **D** $y = \frac{1}{4}x - 20$

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53. A line passes through the points M(4, 3) and N(−2, −9). Which equation is perpendicular to this line?

A $y = -2x + 1$ **B** $y = 2x + 5$ **C** $y = \frac{1}{2}x - 3$ **D** $y = -\frac{1}{2}x - 5$

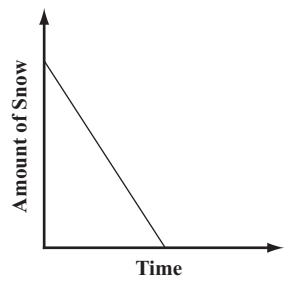
54. What is the solution to $\frac{-2k + 1}{3} = -(k + 2)$?

A -7 **B** -4 **C** -2 **D** -1

55. What is the solution to the system of linear equations $4x - 2y = 12$ and $-2x + 2y = 4$?

A $\left(\frac{1}{3}, 6\right)$ **B** (2, 8) **C** $\left(\frac{11}{2}, 5\right)$ **D** (8, 10)

Use this graph to answer #56.



56. The slope of the graph is

A 0 **B** negative **C** positive **D** undefined

Use this information to answer #57.

Calvin factored the expression $16x^4 - 81y^4$. His work was as follows:

$16x^4 - 81y^4$	Step 1
$= (4x^2 - 9y^2)(4x^2 + 9y^2)$	Step 2
$= (2x - 3y)(2x + 3y)(4x^2 + 9y^2)$	Step 3
$= (2x - 3y)(2x + 3y)(2x + 3y)(2x - 3y)$	Step 4

57. Calvin made his first error in

A Step 1 **B** Step 2 **C** Step 3 **D** Step 4

58. For which x-values does $y = 0$ in the relation $y = -10x^2 + 100x$?

A 0 and 10 **B** 10 and 100 **C** −10 and 100 **D** 0 and −10

Numerical Response

59. Given $f(x) = 2x - 5$ and $f(x) = -4$, what is the value of x, to the nearest tenth?

60. What is $\left(\frac{x^{\frac{3}{2}}}{x^{-2}}\right)^2$ when simplified?

A x^7 **B** x^{-1} **C** $\sqrt{x^7}$ **D** $\sqrt{x}$