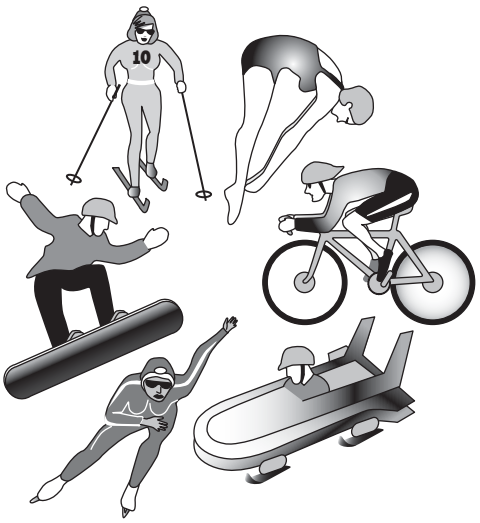
Name: _____ Date: _____

MathLinks 9 Option 2
Final Exam Multiple Choice and Numerical Response

Record your answers on the answer sheet provided.

Sports Events

Sports events, such as the Olympic Summer and Winter Games, make use of mathematics. Apply your knowledge and skills of mathematics to solve problems related to sports events.



Use this information to answer #1–3.

A sports team had this logo.

1. The logo has an order of rotation of

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

2. What is the angle of rotation of the logo?

A 45° **B** 90° **C** 180° **D** 360°

Numerical Response

3. How many lines of symmetry does the logo have?

Name: _____ Date: _____

Use this information to answer #4.

Callie will win a free meal as a guest in the Olympic Village if she answers this skill-testing question correctly.

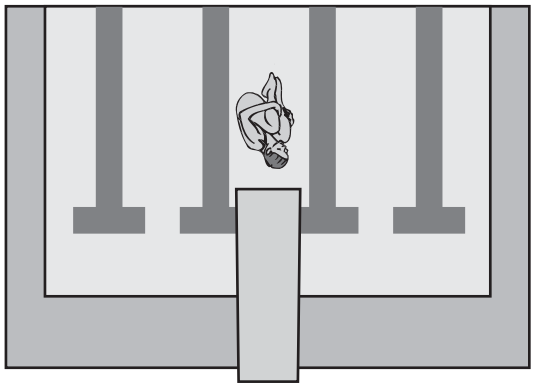
$4^3 \div 4 \times 3 - 12 \div (-1)^3$

4. What answer will win her a free meal?

A 60 **B** 48 **C** -4 **D** -64

Use this information to answer #5.

A diver at the Olympics jumps off a platform 15 m above the surface of the water. He dives 3.2 m below the surface.

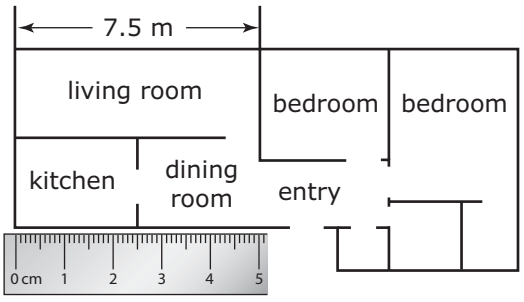


5. Which expression represents the length of his dive?

A $-15 - (3.2)$ **B** $-15 - 3.2$ **C** $15 - (-3.2)$ **D** $15 - 3.2$

Use this information to answer #6.

The diagram shows the floor plan of an apartment for officials at the Olympics. The actual dimensions of the living room are approximately 7.5 m $\times$ 4 m.



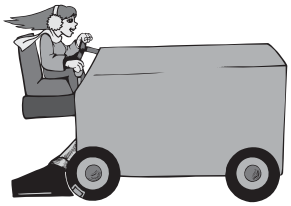
6. What scale is used in the drawing?

A 1 cm = 1 m **B** 1 cm = 1.5 m **C** 1 cm = 2 m **D** 1 cm = 2.5 m

Name: _____ Date: _____

Use this information to answer #7–9.

The owner of an ice resurfacing machine pays employees $22/h and a shift bonus of $15 to groom the skating rink.



7. Which table of values represents the total wages paid for the first four hours in a shift?

A

Time, *t*	1	2	3	4
Total Wages, *w*	15	37	59	81

B

Time, *t*	1	2	3	4
Total Wages, *w*	37	59	81	103

C

Time, *t*	1	2	3	4
Total Wages, *w*	7	74	111	148

D

Time, *t*	1	2	3	4
Total Wages, *w*	37	52	67	82

8. The owner graphed the relationship between time and total wages. On the graph, he could determine the wages owed for 2.5 h of work by using

A extrapolation **B** interpolation **C** sampling **D** simulation

9. In an equation that represents the total wages in relation to time, the shift bonus would be the

A constant **B** linear equation **C** numerical coefficient **D** variable

Use this information to answer #10.

A technician setting up equipment for the media at a sports event charges a fixed cost of $55 plus $45/h.

10. Which equation represents the total cost?

A $C = 55 + 45h$ **B** $C = 45h$ **C** $C = (55 + 45)h$ **D** $C = 55h + 45h$

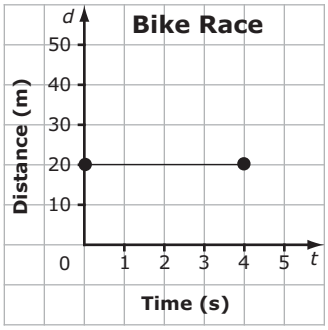
Name: _____ Date: _____

Use this information to answer #11.

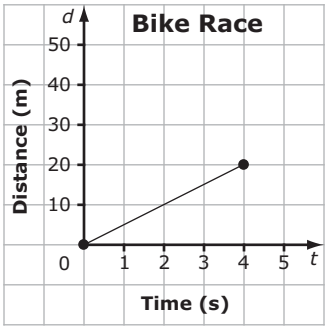
Marc starts at the 20-m mark and then travels an average speed of 5 m/s.

11. Which graph represents the distance that Marc cycles in relation to time?

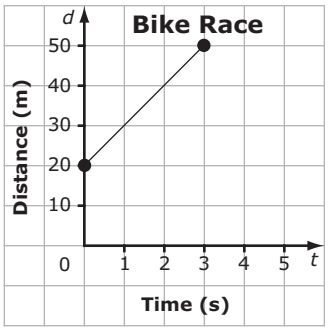
A



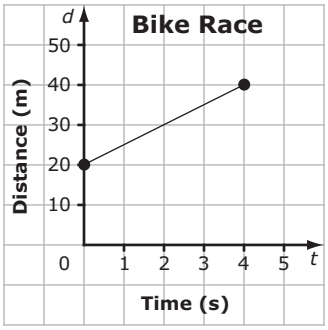
B



C

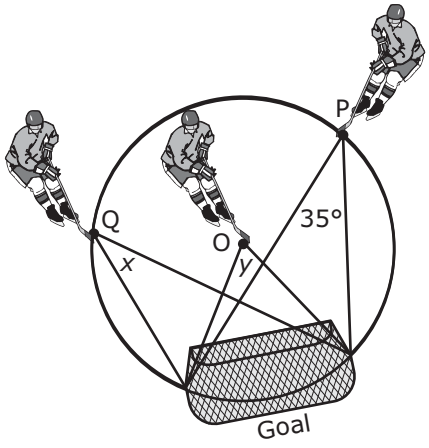


D



Use this information to answer #12.

A circle with centre O represents an area in front of the goal in an arena. Points P and Q lie on the circle. A hockey player is located at points O, P, and Q.



12. The hockey players at Q and O would shoot respectively at angles of

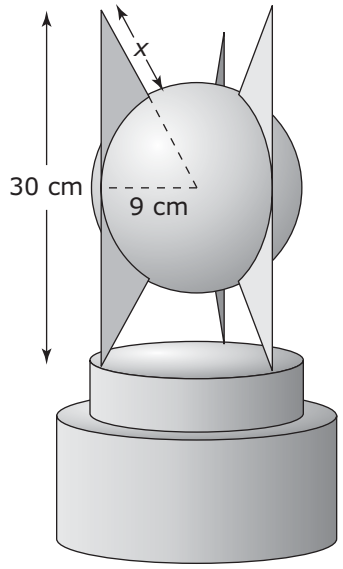
A $x = 35°$ and $y = 35°$ **B** $x = 35°$ and $y = 17.5°$

C $x = 70°$ and $y = 35°$ **D** $x = 35°$ and $y = 70°$

Name: _____ Date: _____

Use this information to answer #13.

A trophy has three isosceles triangles embedded in a sphere. One edge of each triangle is tangent to the sphere and is bisected at the point of tangency. The vertex of the triangle at the centre of the sphere forms a central angle with lines extending beyond the sphere.



13. Determine the length of x, to the nearest tenth of a centimetre.

A 6.0 cm **B** 8.5 cm **C** 10.0 cm **D** 17.5 cm

Use this information to answer #14.

The organizers for a figure skating competition wanted to know how much warm-up time figure skaters prefer.

14. What would a survey of all of the figure skaters at the competition represent?

A population **B** proportion **C** ratio **D** sample

Use this information to answer #15.

There is a linear relationship between a bike's gear ratio and speed in kilometres per hour. Suppose the bike is pedaled at a constant rate of 60 revolutions per minute.

	1st Gear	2nd Gear	3rd Gear	4th Gear	5th Gear
Gear Ratio, *g*	$\frac{50}{25}$	$\frac{50}{20}$	$\frac{50}{15}$	$\frac{50}{12}$	$\frac{50}{10}$
Speed, *s*, (km)	16.0	20.0	26.7	33.3	40.0

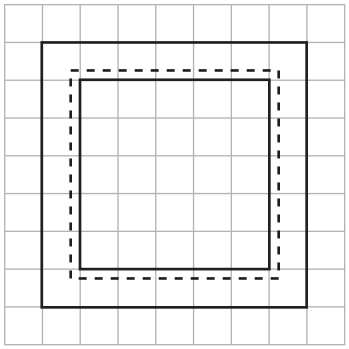
15. Which equation represents the relationship between the gear ratio, g, and the speed, s?

A $s = -8g$ **B** $s = -2g$ **C** $s = 2g$ **D** $s = 8g$

Name: _____ Date: _____

Use this information to answer #16–17.

Two squares are shown on the grid.



16. Which rational number could represent the dashed line?

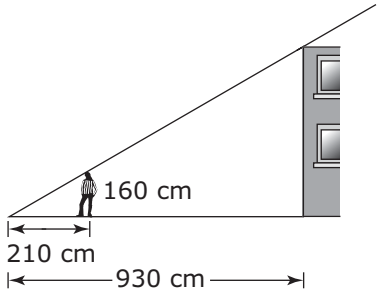
A $\sqrt{20}$ **B** $\sqrt{22}$ **C** $\sqrt{24}$ **D** $\sqrt{26}$

Numerical Response

17. The perfect square that is located between the two squares can be written as $\sqrt{x}$. What is the value of x?

Use this information to answer #18.

An arena office casts a shadow 930 cm in length. A referee standing nearby casts a shadow 210 cm in length.



18. To the nearest centimetre, how tall is the arena office?

A 650 cm **B** 709 cm **C** 850 cm **D** 908 cm

Use this information to answer #19.

A downhill slalom racer averaged 54.12 s on his first three practice runs. On his next three runs, he lost 0.24 s, gained 0.35 s, and lost 0.01 s, respectively. **Hint:** When a racer gains time, his finishing time is less than the previous time. When he loses time, his finishing time is greater than the previous time.

19. What was the slalom racer's average time on his last three runs?

A 54.02 s **B** 54.15 s **C** 54.22 s **D** 54.42 s

Name: _____ Date: _____

Use this information to answer #20.

The organizers of a sports event plan to hold a dance for athletes attending the event. Each team will pay a fee per athlete in attendance. The organizers expect revenues equal to three times the number of athletes attending. From that they must pay the band $1200.

20. Which table of values represents the profit?

A

Number of Athletes, *n*	0	100	200	300	400
Profit, *p*, ($)	−1200	−900	−600	−300	0

B

Number of Athletes, *n*	0	100	200	300	400
Profit, *p*, ($)	1200	1500	1800	2100	2400

C

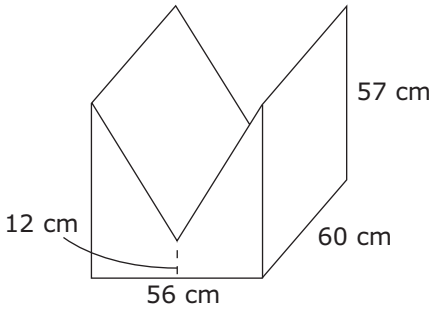
Number of Athletes, *n*	0	100	200	300	400
Profit, *p*, ($)	0	300	600	900	1200

D

Number of Athletes, *n*	0	100	200	300	400
Profit, *p*, ($)	1200	900	600	300	0

Use this information to answer #21–22.

The poles that hold flags and coloured markers for ski events are stored in the V-shaped holder shown.



21. The two rectangular faces that form the V-shape need to be covered with outdoor carpet. What is the minimum amount of carpet needed?

A 6360 cm^2 **B** 636.0 cm^2 **C** 63.6 cm^2 **D** 6.36 cm^2

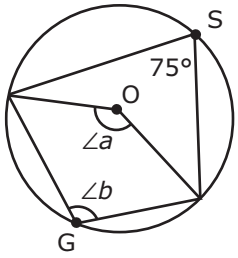
Numerical Response

22. A shipment of 400 pole holders arrived but 52 of them were damaged. Based on this sample, how many pole holders would you expect to be damaged in a shipment of 300 holders?

Name: _____ Date: _____

Use this information to answer #23–24.

A goalie is positioned at point G. Two shooters are in position at points O and S. Point O is the centre of the circle.



Numerical Response

23. What is the measure of $\angle a$?

Numerical Response

24. What is the sum of $\angle b$ and 75°?

Use this information to answer #25.

During the last heat of a 600-m run, Julie gained time over her opponents in the first 100 m. She lost $\frac{2}{3}$ s during the first 100 m. She lost another $\frac{1}{8}$ s during the second 100 m and gained $\frac{1}{2}$ s during the third 100 m.
Hint: In a race, gaining time means reducing the amount of time taken.

25. Which expression represents the time that Julie must gain during the final 100 m in order to win the race?

A $t < \frac{7}{24}s$ **B** $t \leq \frac{7}{24}s$ **C** $t \geq \frac{7}{24}s$ **D** $t > \frac{7}{24}s$

Use this information to answer #26.

At the end of a sports event, the organizers plan to survey the athletes about the accommodations. They decide to survey every fifth athlete as people leave the event.

26. What type of survey is this?

A convenience sample **B** random sample
C stratified sample **D** systematic sample

Name: _____ Date: _____

Connections

Many concepts and skills that you learn in mathematics can be applied to new situations. Connect the concepts and skills you have learned in *MathLinks 9* to solve problems.

27. Which symbol will make the expression $-2\frac{4}{5}$ ■ -2.08 true?

A $>$ **B** $<$ **C** $\leq$ **D** $=$

Numerical Response

28. What is the missing value in ■ $\times$ $3\frac{3}{4} = 5\frac{1}{4}$? Express the answer to the nearest tenth.

29. If m is a positive integer, what is the value of $-\frac{1}{2} \times m$?

A a negative value less than m **B** a positive value less than m

C a negative value greater than m **D** a positive value greater than m

Use this information to answer #30.

Kevin solved the expression $4^3 \div [8(6^0 - 3)]$. His work was as follows:

$4^3 \div [8(6^0 - 3)]$	
$= 64 \div [8(1 - 3)]$	Step 1
$= 64 \div [8 - 24]$	Step 2
$= 8 - 24$	Step 3
$= -16$	Step 4

30. Kevin made his first mistake in

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

31. What is the base in the expression -4^3?

A -4 **B** -1 **C** 3 **D** 4

Name: _____ Date: _____

32. What is the simplified form of the expression $(x^2y^5)^4$?

A x^6y^9 **B** x^8y^5 **C** x^8y^{20} **D** $x^{16}y^{25}$

33. Which rational number does *not* lie between 8 and 9?

A $\sqrt{62}$ **B** $\sqrt{72}$ **C** $\sqrt{78}$ **D** $\sqrt{80}$

Use this information to answer #34.

Compare the following rational numbers.

0.33	$-\frac{3}{8}$	$\frac{3}{4}$	-0.111
1	**2**	**3**	**4**

Numerical Response

34. Using the numerals 1, 2, 3, and 4, list the rational numbers in descending order.

35. Which expression is *not* equivalent to $\frac{a^8}{a^3a^2}$?

A $\frac{a^8}{a^5}$ **B** $\frac{a^8}{a^6}$ **C** $\frac{a \times a \times a \times a \times a \times a \times a \times a}{(a \times a \times a)(a \times a)}$ **D** a^3

36. Which description is true about a biased sample?

A each individual has an equal chance of being chosen

B makes survey results accurate

C includes all of the individuals in a population

D does not represent the population

37. In the expression "five squared," what is the exponent?

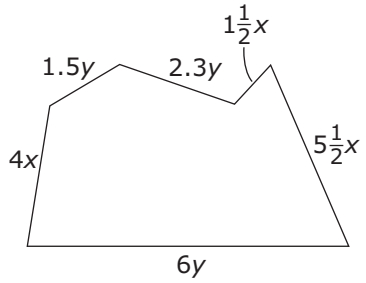
A 2 **B** 5 **C** 10 **D** 25

38. If $1296 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3$, which expression is equal to $\sqrt{\frac{1296}{25}}$?

A $\frac{2^4 \times 3^4}{5^2}$ **B** $\frac{2 \times 2 \times 2 \times 2}{5}$ **C** $\frac{3 \times 3 \times 3 \times 3}{5}$ **D** $\frac{3^2 \times 2^2}{5}$

Name: _____ Date: _____

Use this figure to answer #39.



39. The expression for the perimeter of the figure is

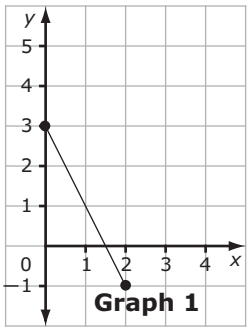
A $20.8x$ units **B** $20.8y$ units **C** $10x + 9.1y$ units **D** $11x + 9.8y$ units

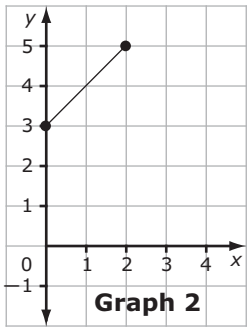
40. Which statement is true?

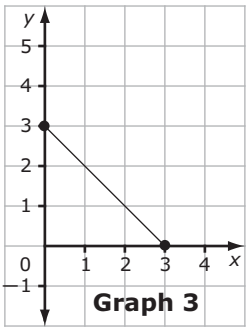
A $4^5 + 4^7 = 4^{12}$ **B** $4^{12} - 4^4 = 4^8$ **C** $4^2 \times 4^5 = 4^7$ **D** $4^5 + 4^3 = 4^{15}$

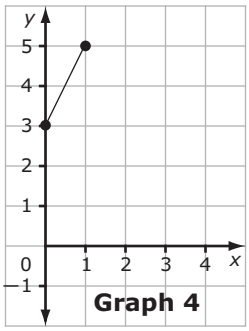
Use this information to answer #41.

Each graph shows a linear relation.









Numerical Response

41. Choose the graph number that matches each linear equation shown below. Write the graph numbers in the same order as the equations.

$y = 2x + 3$
$y = x + 3$
$y = 3 - x$
$y = -2x + 3$

42. Which expression is equivalent to $\frac{-6x^2 + 12x + 18}{3}$?

A $2x^2 - 4x + 6$ **B** $-2x^2 + 4x + 6$ **C** $-6x + 6$ **D** $8x$

Name: _____ Date: _____

Use this information to answer #43.

x	1	2	3	4	5	6
y					18	21

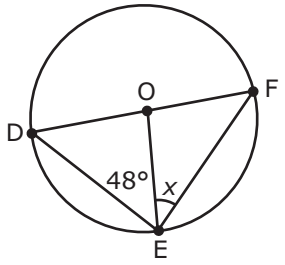
43. A possible set of values is

A $x = 1$ and $y = 3$ **B** $x = 2$ and $y = 9$

C $x = 3$ and $y = 15$ **D** $x = 4$ and $y = 16$

Use this diagram to answer #44.

The circle has a diameter DF and chords DE and EF.



44. What is the measure of $\angle x$?

A 42° **B** 48° **C** 54° **D** 62°

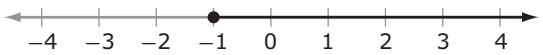
45. The solution to $5 + \frac{2}{3}r \geq 4 + \frac{1}{3}r$ is

A $r \geq -\frac{2}{3}$ **B** $r \leq -\frac{2}{3}$ **C** $r \geq -3$ **D** $r \leq -3$

46. Which number line represents the solution to $4x + 2 \leq -6$?

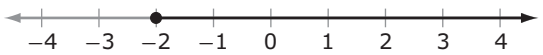
A

B



C

D



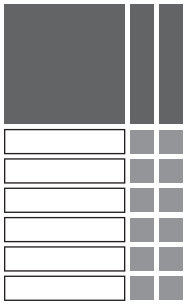
47. Which expression is the simplified form of $4(2p - 1) - 3(p - 6)$?

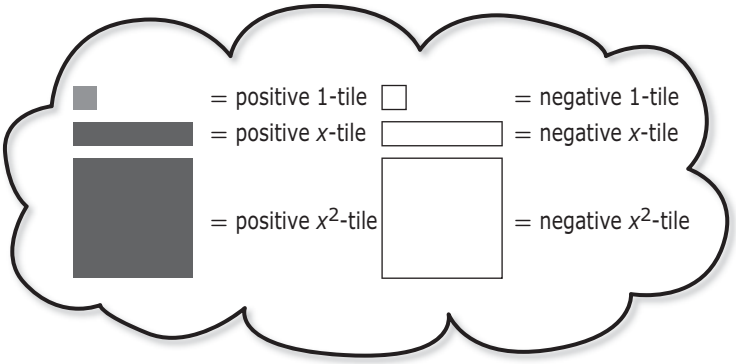
A $p - 7$ **B** $5p + 14$ **C** $5p - 22$ **D** $11p - 17$

Name: _____ Date: _____

Use this information to answer #48.

Shannon used algebra tiles to model an expression.





48. Which algebraic expression do the algebra tiles represent?

A $x^2 + 8x + 12$ **B** $x^2 + 6x + 12$

C $x^2 - 4x + 12$ **D** $x^2 - 6x + 12$

49. Which polynomial does *not* have a degree of 2?

A $2p(p - 1) + 3(p^2 + 3)$ **B** $2x + 2x + 8$

C $-3xy + 5$ **D** $4p^2$

50. The constant term in $-3x^2 + 7 + 6x$ is

A x **B** -3 **C** 6 **D** 7

Use the diagram to answer #51.

The ratio of this image of a stamp to the actual stamp is 2 : 1.

51. Which stamp best represents the size of the actual stamp?

A 

B 

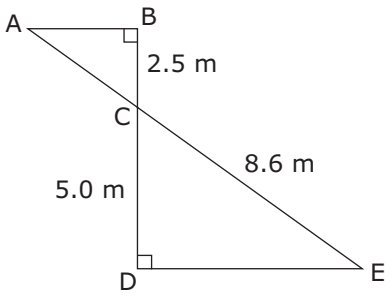
C 

D 

Name: _____ Date: _____

Use this diagram to answer #52.

ΔABC is similar to ΔEDC.

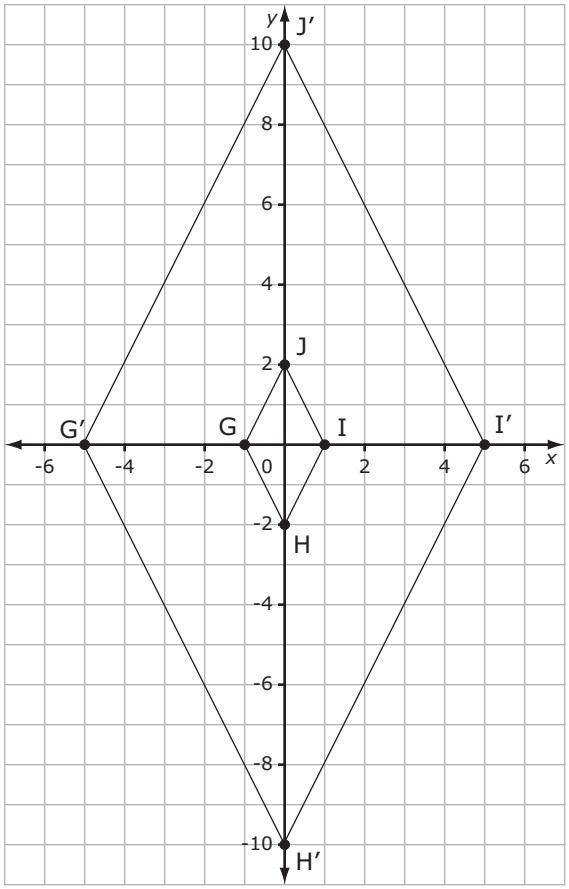


Numerical Response

52. What is the length of AE, to the nearest tenth of a metre?

Use this diagram to answer #53.

Rhombus G'H'I'J' is an enlargement of rhombus GHIJ.



53. What scale factor was used to create the enlargement?

A $\frac{1}{4}$ **B** $\frac{1}{5}$ **C** 4 **D** 5

Name: _____ Date: _____

54. Ken plans to survey people about the need for a new recreation centre in his town. He decides to use a random sample. Which group will provide the most representative sample?

A people living in town

B business people in town

C students from the school in town

D people living in town and in the surrounding area

Use this diagram to answer #55.

The biological hazard symbol warns about organisms that may cause infection.

55. What type of symmetry does the biological hazard symbol show?

A line symmetry

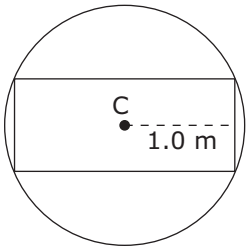
B rotation symmetry

C both line and rotation symmetry

D neither line nor rotation symmetry

Use this diagram to answer #56.

Point C is the centre of the circle. The distance from point C to the edge of the rectangle is 1 m.



56. If the diameter of the circle is 2.5 m, what is the length and width of the rectangle, to the nearest hundredth of a unit?

A $l = 1.0$ m and $w = 0.75$ m **B** $l = 2.5$ m and $w = 1.0$ m

C $l = 2.0$ m and $w = 0.75$ m **D** $l = 2.0$ m and $w = 1.5$ m

57. What is the value of $-3\frac{1}{3}x \div y$ when $x = 0.3$ and $y = \frac{3}{4}$?

A $-\frac{4}{3}$ **B** $-\frac{3}{4}$ **C** $-\frac{9}{40}$ **D** $-\frac{40}{9}$

Name: _____ Date: _____

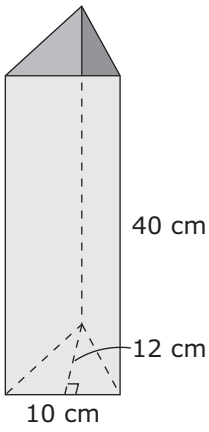
Numerical Response

58. What is the solution to $\frac{1}{2}(2x - 3) = \frac{3}{4}(x + 4)$?

59. Which value is a solution to $\frac{4}{5}(2x - 1) \leq -\frac{2}{3}(3x + 6)$?

A 1 **B** $\frac{8}{9}$ **C** $-\frac{3}{4}$ **D** -1

Use this diagram to answer #60.



60. What is the surface area of the right triangular prism?

A 460 cm^2 **B** 1040 cm^2 **C** 1200 cm^2 **D** 1500 cm^2