Final Exam Review

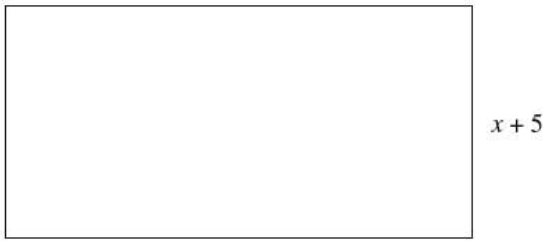
Section 1: Polynomials

NOTE: NC = Non-Calculator Section

1. Which two numbers have the following properties?
   - Their GCF is 12.
   - Their LCM is 72.

   A. 2 and 3
   B. 24 and 36
   C. 48 and 72
   D. 72 and 864

2. Given that the area of the rectangle below is $2x^2+9x-5$, determine the length of the rectangle.



   A. $2x-1$
   B. $2x+1$
   C. $2x+9$
   D. $2x^2+8x-10$

3. Expand and simplify: $(x-4)^3$

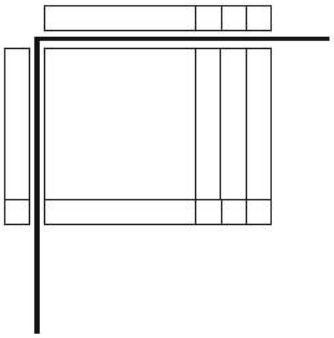
   A. $x^3-12x^2+48x-64$
   B. $x^3+12x^2+48x+64$
   C. $x^3-4x^2+16x+64$
   D. x^3-64

4. Katie simplified the expression $(x+b)(x+c)$, where $b<0$ and $c<0$, to the form x^2+gx+k. What must be true about g and k?

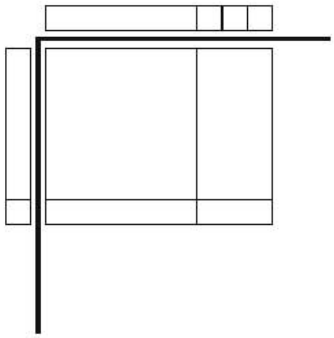
   A. $g<0$ and $k>0$
   B. $g<0$ and $k<0$
   C. $g>0$ and $k>0$
   D. $g>0$ and $k<0$

5. Which of the following diagrams best represents the expansion of $(x+3)(x+1)$ pictorially?

A.



B.



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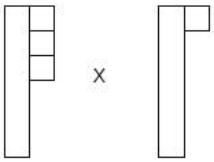

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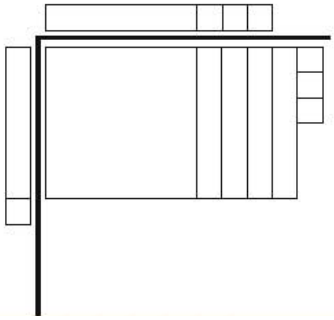


6. How many integer values are there for k for which $4x^2 + kxy - 9y^2$ is factorable?

7. Factor: $y^2 - 81$

A. $(y-9)^2$
B. $(y+9)^2$
C. $(y+9)(y-9)$
D. $(y+3)(y-3)(y+9)$

8. Which of the following expressions have a factor of $x+2$?

I.	$x^2 - 4$
II.	$2x^2 - x - 10$
III.	$5x + 10$

A. I only
B. III only
C. I and III only
D. I, II and III

9. Expand and simplify: $(4x-3)^2$

A. $16x^2 + 9$
B. $16x^2 - 12x + 9$
C. $16x^2 - 24x - 9$
D. $16x^2 - 24x + 9$

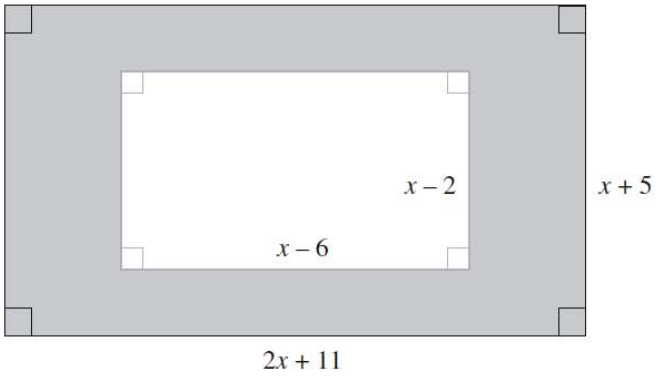
10. Pam expanded and simplified $(x-3)(x^2+2x-4)$, as shown below.

Steps	
I.	$x(x^2+2x-4)-3(x^2+2x-4)$
II.	$x^3+2x^2-4x-3x^2+6x-12$
III.	$x^3-x^2+2x-12$

In which step is Pam's first error?

A. Step I
B. Step II
C. Step III
D. There is no mistake.

11. Determine an expression to represent the shaded area below.



A. $x^2 + 43$
B. $x^2 + 13x + 67$
C. $x^2 + 29x + 43$
D. $3x^2 + 13x + 67$

12. Determine the greatest common factor of $12x^5y$, $4x^3y^2$ and $6x^2y^4$.

A. $2xy$
B. $2x^2y$
C. $4x^3y^2$
D. $12x^5y^4$

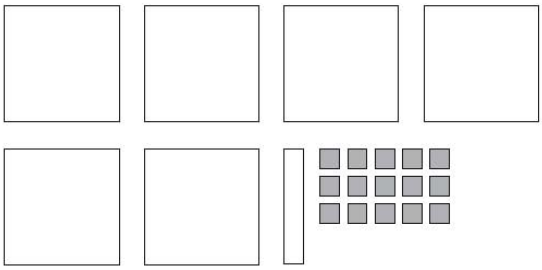
13. Which of the following expressions is a factor of $x^2 - 8x - 20$?

A. $x - 2$
B. $x - 4$
C. $x - 5$
D. $x - 10$

14. When completely factored, how many factors does $2x^4 - 24x^2 - 128$ have?

A. 2
B. 3
C. 4
D. 5

15. Joe was asked to factor $6x^2 + x - 15$ and represent it with math tiles.



What additional tiles would he need to represent the total area of the two factors?

A. 8 each of ▭ and ▬

B. 9 each of ▭ and ▬

C. 10 each of ▭ and ▬

D. 11 each of ▭ and ▬

16. A bacteria culture doubles every hour. If there are 10 000 bacteria now, how many bacteria were there 4 hours ago? Answer to the nearest bacterium.

Section 2: Exponents and Radicals

17. What is the least common multiple of 18 and 24?

NC

A. 2×3

B. $2^2 \times 3^3$

C. $2^3 \times 3^2$

D. $2^4 \times 3^3$

18. What is the greatest common factor of $12, 24, 30, 72$?

NC

A. 360

B. 12

C. 6

D. 2

19. . Express $2\sqrt{5}$ as an entire radical.

NC

A. $\sqrt{10}$
B. $\sqrt{20}$
C. $\sqrt{50}$
D. $\sqrt{100}$

20. Order the numbers from the smallest value to the largest value.

NC

I.	$-3\sqrt{2}$
II.	$\sqrt{9}$
III.	$2\sqrt{3}$
IV.	$-2\sqrt{7}$

A. I, IV, II, III
B. I, IV, III, II
C. IV, I, II, III
D. IV, I, III, II

21. Simplify: $\left(2x^3\right)^3 \bullet 3x^4$

NC

A. $24x^{36}$
B. $24x^{13}$
C. $18x^{36}$
D. $6x^{13}$

22. Which one of the following sets of numbers contains only rational numbers?

A. $\left\{-\frac{3}{4},\ 7.1,\ \sqrt{16}\right\}$
B. $\left\{\frac{1}{2},\ -6,\ \frac{\sqrt{5}}{2}\right\}$
C. $\left\{-3,\ 4.\overline{23},\ 4.121314\ldots\right\}$
D. $\left\{\sqrt{10},\ 3\sqrt{9},\ \pi\right\}$

23. Simplify: $\sqrt[3]{1080}$

A. $2\sqrt[3]{135}$
B. $3\sqrt[3]{40}$
C. $6\sqrt[3]{5}$
D. $6\sqrt[3]{30}$

24. Simplify: $\left(3a^2\right)^3\left(4a^3\right)^0$

A. $9a^6$
B. $27a^6$
C. $36a^8$
D. $108a^9$

25. Which expression is equivalent to $\left(-c^2\right)^{-\frac{1}{3}}$?

A. $\frac{1}{\sqrt[3]{-c^2}}$
B. $\frac{1}{\sqrt[3]{c^2}}$
C. $\frac{1}{\sqrt{-c^3}}$
D. $\sqrt[3]{c^2}$

26. Simplify: $\sqrt{x^3} \div \sqrt[3]{x^4}$

A. $\sqrt[6]{x}$
B. $\sqrt[8]{x^9}$
C. $\sqrt[9]{x^8}$
D. $\sqrt[12]{x}$

27. Which of the following statements are true?

NC

I.	$\sqrt{4} = 2$ since $2 \times 2 = 4$
II.	$\sqrt{8} = 4$ since $4 + 4 = 8$
III.	$\sqrt[3]{27} = 3$ since $3 \times 3 \times 3 = 27$
IV.	$\sqrt[3]{81} = 9$ since $9 \times 9 = 81$

A. I and III only
B. I and IV only
C. II and III only
D. II and IV only

28. Which of the following statements are true?

NC

I.	The factors of 24 are 2, 3, 4, 6, 8 and 12.
II.	The prime factorization of 24 is $2^3 \times 3^1$.
III.	The prime factors of 24 are 2 and 3.
IV.	$\sqrt{24}$ is an irrational number.

A. I and IV only
B. II and III only
C. II, III and IV only
D. I, II, III and IV

29. Simplify: $\sqrt{72}$

NC

A. $2\sqrt{6}$
B. $6\sqrt{2}$
C. $18\sqrt{2}$
D. $36\sqrt{2}$

30. Evaluate: $16^{-\frac{3}{4}}$

A. -8
B. $\frac{1}{8}$
C. $\frac{1}{2}$
D. 2

31. Which pattern could be used to predict 3^{-4}?

NC

A.

3^3	27
3^2	9
3^1	3
3^0	1
3^{-1}	$\frac{1}{3}$
3^{-2}	$\frac{1}{9}$
3^{-3}	$\frac{1}{27}$

B.

3^3	9
3^2	6
3^1	3
3^0	0
3^{-1}	$-\frac{1}{3}$
3^{-2}	$-\frac{1}{6}$
3^{-3}	$-\frac{1}{9}$

C.

3^3	27
3^2	9
3^1	3
3^0	1
3^{-1}	–3
3^{-2}	–9
3^{-3}	–27

D.

3^3	9
3^2	6
3^1	3
3^0	0
3^{-1}	–3
3^{-2}	–6
3^{-3}	–9

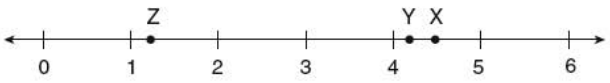
32. Which of the following number lines best represents the placement of X, Y, Z, given:

$X = 2\sqrt{5}$

Y = cube root of 68

$Z = \sqrt[4]{2}$

A.



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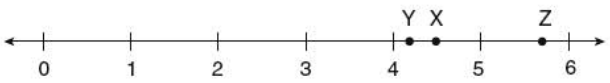

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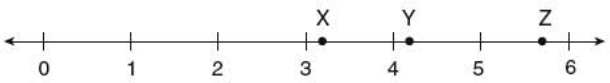
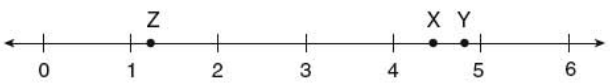


D.



33. Chantal made a mistake in her simplification of $\frac{(3a^5)^{-2}}{a^4}$.

Steps	
I.	$\frac{1}{(3a^5)^2(a^4)}$
II.	$\frac{1}{(3)^2(a^5)^2(a^4)}$
III.	$\frac{1}{(9)(a^7)(a^4)}$
IV.	$\frac{1}{9a^{28}}$

Which step contains her first mistake?

A. Step I
B. Step II
C. Step III
D. Step IV

34. Simplify: $\left(\frac{25x^a}{125x^3}\right)^3$

A. $\frac{x^{3a-9}}{125}$

B. $\frac{x^{a-3}}{5}$

C. $125x^{3a-9}$

D. $\frac{x^{27a}}{5}$

35. A research assistant calculated the brain mass, b, of an 8 kg cat. She used the formula $b = 0.01m^{\frac{2}{3}}$, where m is the total mass of the cat.

Steps	
I.	$b = 0.01\sqrt[3]{8^2}$
II.	$b = 0.01\sqrt[3]{16}$
III.	$b \approx 0.01(2.52)$
IV.	$b \approx 0.025$

In which step did the research assistant first make a mistake?

A. Step I
B. Step II
C. Step III
D. Step IV

Section 3: Measurement and Surface Area

36. A road sign says to turn right in 1000 feet. Approximately how far is this distance in kilometres?

NC
A. 0.3 km
B. 0.6 km
C. 1 km
D. 1.5 km

37. Which of the following calculations converts 4 yards into centimetres?

NC
A. $4\text{ yd} \times \frac{2.54\text{ cm}}{1\text{ in}}$

B. $4\text{ yd} \times \frac{3\text{ ft}}{1\text{ yd}} \times \frac{2.54\text{ cm}}{1\text{ ft}}$

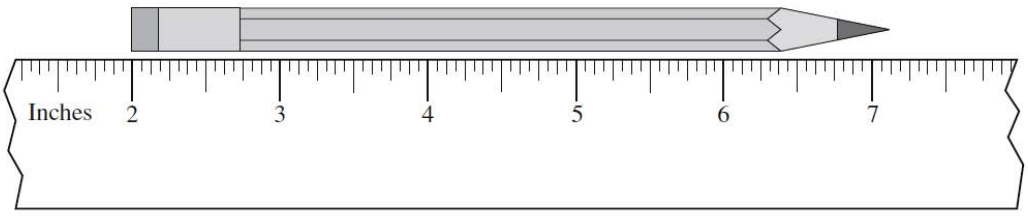
C. $4\text{ yd} \times \frac{3\text{ ft}}{1\text{ yd}} \times \frac{12\text{ in}}{1\text{ ft}} \times \frac{2.54\text{ cm}}{1\text{ in}}$

D. $4\text{ yd} \times \frac{1\text{ ft}}{3\text{ yd}} \times \frac{1\text{ in}}{12\text{ ft}} \times \frac{1\text{ cm}}{2.54\text{ in}}$

38. A cylinder with a diameter of 10 cm and a height of 12 cm is half full of water. A sphere with a diameter of 5 cm is dropped into the cylinder. How far will the water level rise once the sphere is completely under the water?

A. 0.57 cm
B. 0.83 cm
C. 5 cm
D. 6 cm

39. Using the ruler below, determine the length of the pencil.



A. $5\frac{1}{8}$"

B. 5.2"

C. $5\frac{1}{4}$"

D. $7\frac{1}{8}$"

40. Jung was told to plant trees two steps apart. Which of the following estimates is closest to "two steps apart"?

A. 6 ft
B. 3 m
C. 60 cm
D. 30 in

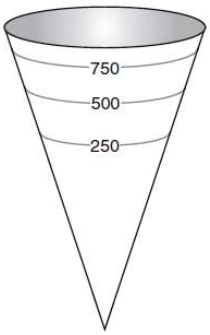
41. Which distance below is the longest?

0.6 mi, 1000 yd, 1 km, 900 m

A. 0.6 mi
B. 1000 yd
C. 1 km
D. 900 m

42. A cone-shaped water tank has a volume of 1000 litres. Which diagram best represents the 250 L, 500 L and 750 L marks outside of the water tank?

A.



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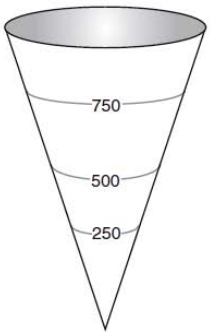

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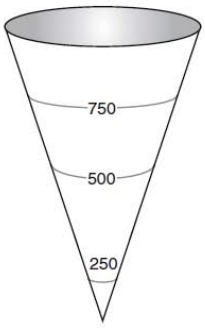
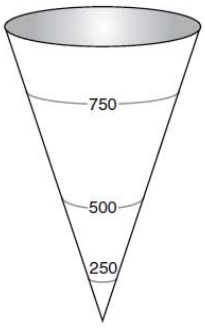
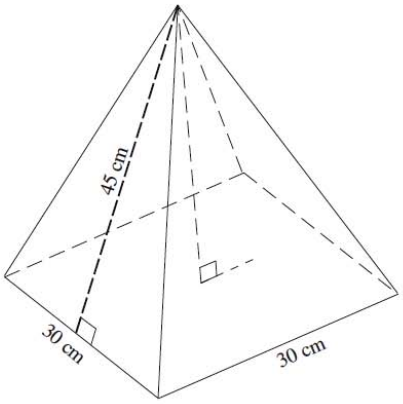


D.

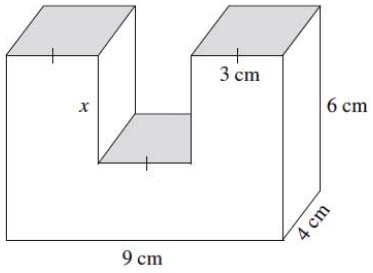


43. The slant height of the pyramid below is 45 cm. Calculate its volume.



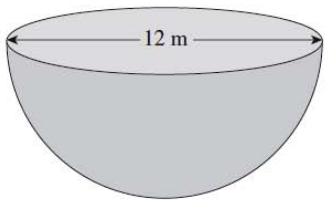
A. 10 062 cm^3
B. 12 728 cm^3
C. 13 500 cm^3
D. 40 500 cm^3

44. The volume of the object below is 186 cm^3. Calculate the length of x.



A. 3.1 cm
B. 2.5 cm
C. 1.75 cm
D. 1.25 cm

45. Calculate the surface area of the solid hemisphere below. Answer to the nearest square metre.



46. On a quiz, students were asked to convert 5 lbs 4 oz to a metric weight.

	Stan's Solution	Erin's Solution
Step 1	$4\text{ oz} \times \frac{1\text{ lb}}{16\text{ oz}} = 0.25\text{ lb}$	$5\text{ lb} \times \frac{16\text{ oz}}{1\text{ lb}} = 80\text{ oz}$
Step 2	$5.25\text{ lb} \times \frac{0.454\text{ kg}}{1\text{ lb}} \approx 2.3835\text{ kg}$	$84\text{ oz} \times \frac{28.35\text{ g}}{1\text{ oz}} \approx 2381.4\text{ g}$

How should the teacher mark these two solutions?

A. Only Erin's solution is correct.
B. Only Stan's solution is correct.
C. Both Stan and Erin gave a correct solution.
D. Neither Stan nor Erin gave a correct solution.

47. A baker gets his muffin boxes from the United States. The tallest muffins he bakes are 11 cm. Estimate the height of the smallest box in which the muffins will fit.

NC

A. 30 inches tall
B. 10 inches tall
C. 5 inches tall
D. 4 inches tall

48. Jasdeep and Kelsey converted 177 ounces into kilograms, as shown below.

NC

Jasdeep's Solution	Kelsey's Solution
$177\text{ oz} \times \frac{28.35\text{ g}}{1\text{ oz}} \times \frac{1\text{ kg}}{1000\text{ g}} = 5\,017\,950\text{ kg}$	$177\text{ oz} \times \frac{1\text{ oz}}{28.35\text{ g}} \times \frac{1\text{ kg}}{1000\text{ g}} = 0.0062\text{ kg}$

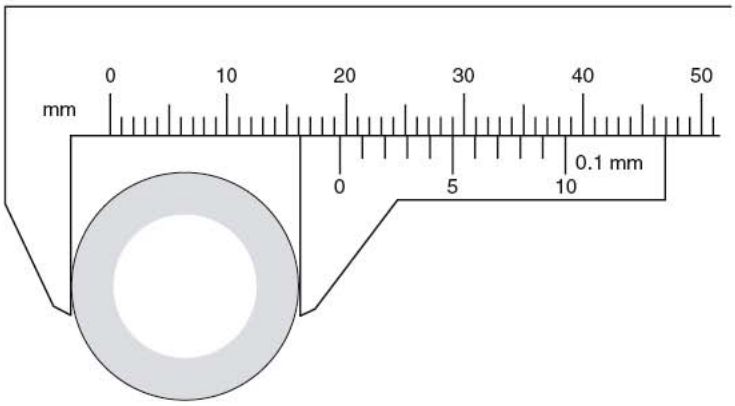
Which statement below is true?

A. Only Kelsey is correct because the units cancel.
B. Only Jasdeep is correct because the units cancel.
C. Only Kelsey is incorrect because the conversion factors are incorrect.
D. They are both incorrect for different reasons.

49. As an estimation strategy, what could be used to best approximate one centimetre?

A. the length of your foot
B. the width of your hand
C. the width of your finger
D. the width of a pencil lead

50. Sarah needs to replace the exhaust pipe on her dirt bike. She uses a Vernier calliper to find the diameter of the pipe.



What is the diameter of the pipe?

A. 16.1 mm
B. 19.2 mm
C. 19.5 mm
D. 29.0 mm

51. Two isosceles triangles have the same height. The slopes of the sides of triangle A are double the slopes of the corresponding sides of triangle B. How do the lengths of their bases compare?

A. The base of A is quadruple that of B.
B. The base of A is double that of B.
C. The base of A is half that of B.
D. The base of A is one quarter that of B.

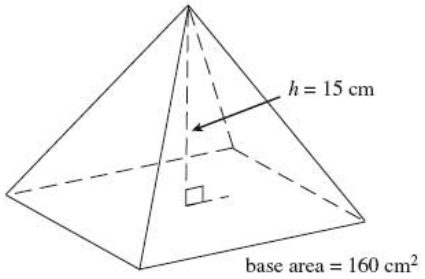
52. A cylinder has a surface area of 402 cm^2. The height is three times greater than the radius. What is the height of the cylinder?

A. 8.00 cm
B. 10.48 cm
C. 12.00 cm
D. 16.97 cm

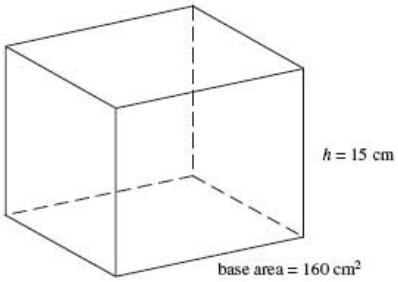
53. A bowling ball measures 264 cm in circumference. What is the volume of the smallest cube that will hold this ball?

A. approximately 75 000 cm^3
B. approximately 311 000 cm^3
C. approximately 594 000 cm^3
D. approximately 2 300 000 cm^3

54. Which of the following shapes has a volume three times larger than the pyramid below?



A.



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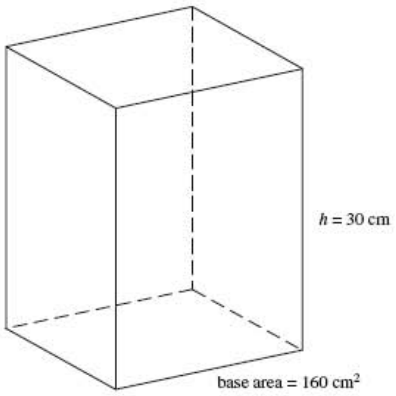
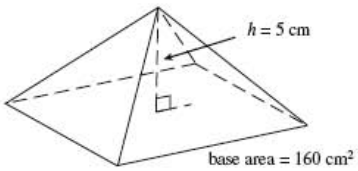
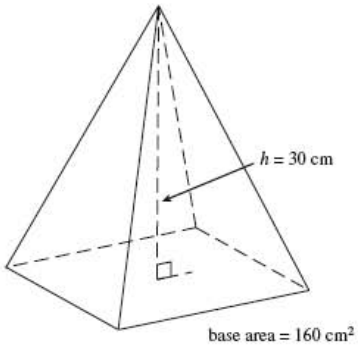


C.

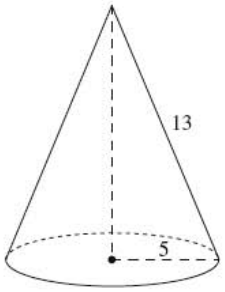


D.

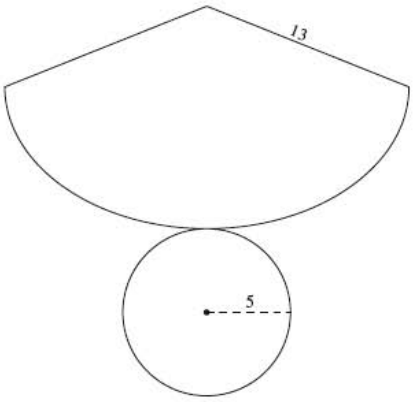


55. Convert 150 pounds into kilograms. Answer to the nearest kilogram.

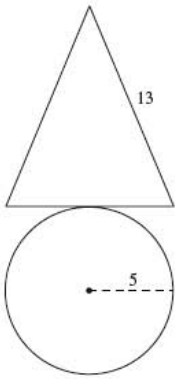
56. Which of the following net diagrams best constructs the cone below?



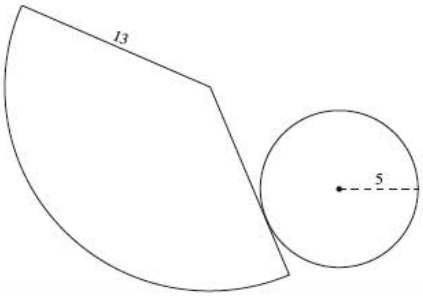
A.



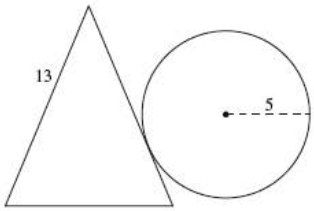
B.



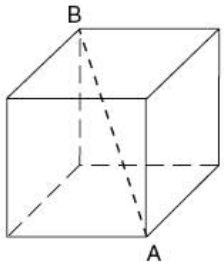
C.



D.



57. Polar Company has designed an ice block in the shape of a cube. The volume of the cube is 15 625 cm^3. Which of the following dimensions is the smallest opening of an ice dispenser that will accommodate length AB?

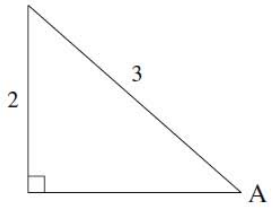


A. 25 cm wide
B. 40 cm wide
C. 45 cm wide
D. over 50 cm wide

Section 4: Trigonometry

58. Determine the ratio of cos A.

NC



A. $\cos A = \frac{2}{3}$

B. $\cos A = \frac{\sqrt{5}}{3}$

C. $\cos A = \frac{\sqrt{13}}{3}$

D. $\cos A = \frac{3}{\sqrt{5}}$

59. The angle of elevation of the sun is 15°. How long is the shadow of a 64 m tall building?

A. 17 m
B. 66 m
C. 239 m
D. 247 m

60. As Tracey is driving, she sees a sign telling her the road has a 7% grade (i.e., a rise of 7 metres for a horizontal change of 100 m). Which of the following expressions will calculate the angle between the road and the horizontal?

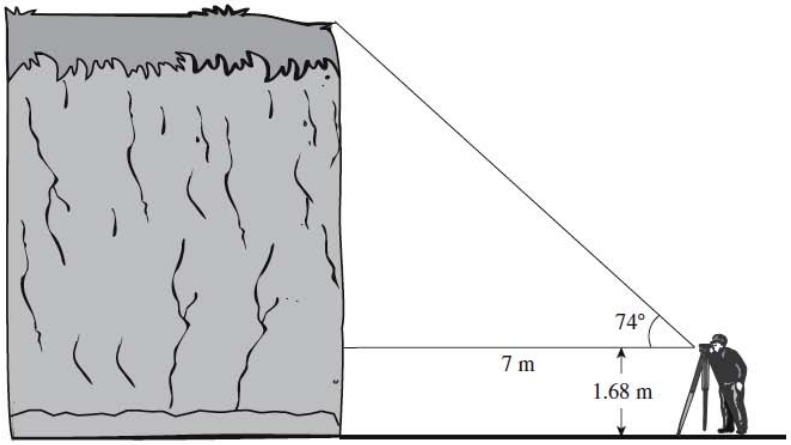
A. $\tan\left(\frac{7}{100}\right)$

B. $\sin\left(\frac{7}{100}\right)$

C. $\tan^{-1}\left(\frac{7}{100}\right)$

D. $\sin^{-1}\left(\frac{7}{100}\right)$

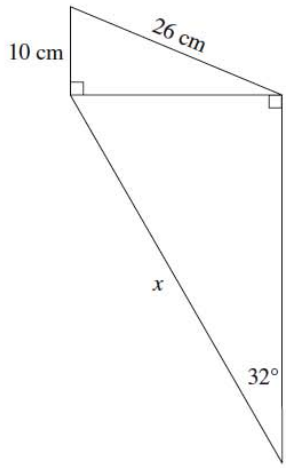
61. Mission's outdoor club collected the following data to determine the height of a cliff.



Calculate the height of the cliff.

A. 3.7 m
B. 8.4 m
C. 24.4 m
D. 26.1 m

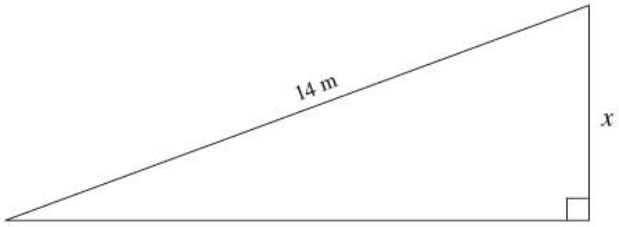
62. Calculate the length of side x on the diagram below. Answer to the nearest centimetre.



63. In ΔABC, $\angle C = 90°$, $AB = 17$ cm and $AC = 15$ cm. Calculate the measure of $\angle ABC$.

A. 28°
B. 41°
C. 49°
D. 62°

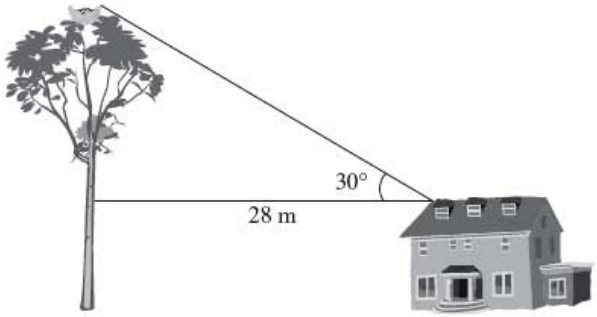
64. Using a protractor, measure one of the unknown angles and determine the length of side x.



Note: This diagram is drawn to scale.

A. 3.5 m
B. 4.8 m
C. 5.1 m
D. 13.2 m

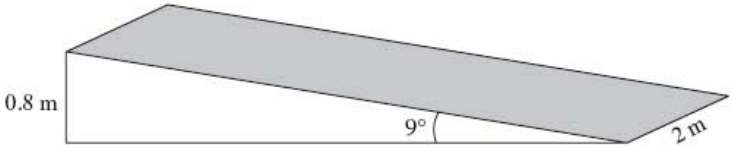
65. A 10 metre tall farmhouse is located 28.0 m away from a tree with an eagle's nest. The angle of elevation from the roof of the farmhouse to the eagle's nest is 30°.



What is the height of the eagle's nest?

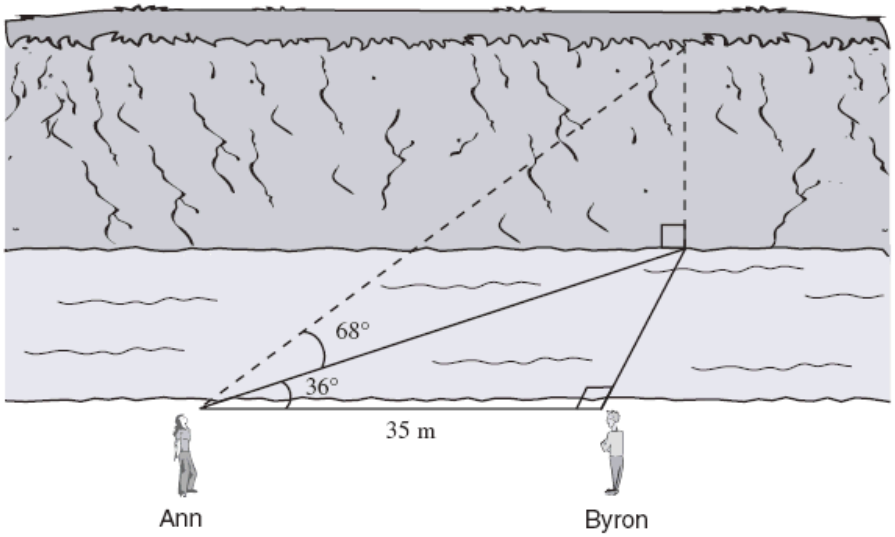
A. 16 m
B. 24 m
C. 26 m
D. 48 m

66. A ramp is set up using a rectangular piece of plywood (shaded region) as shown below.



Calculate the area of the plywood. Answer in square metres to one decimal place.

67. Ann and Byron positioned themselves 35 m apart on one side of a stream. Ann measured the angles, as shown below.



Calculate the height of the cliff on the other side of the stream.

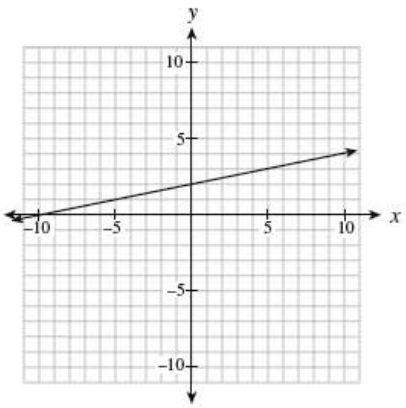
A. 17.5 m
B. 62.9 m
C. 70.1 m
D. 107.1 m

Section 5: Linear Equations and Graphs

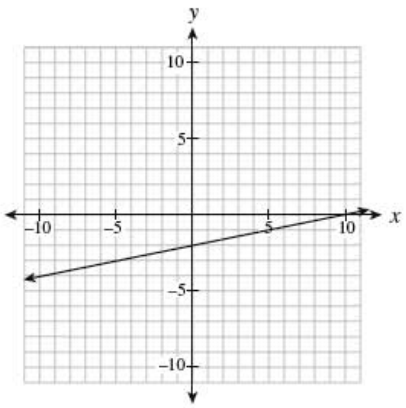
68. Which graph represents the relation $x-5y+10=0$?

NC

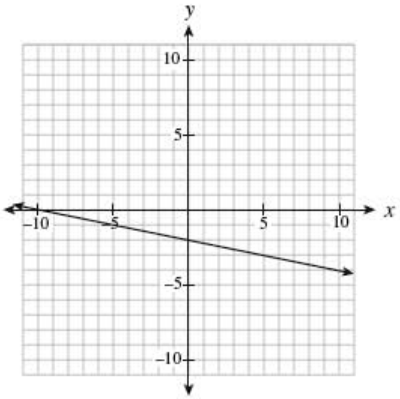
A.



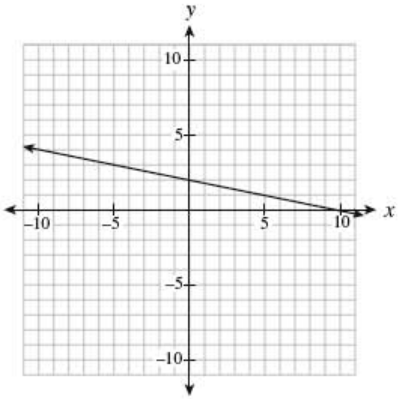
B.



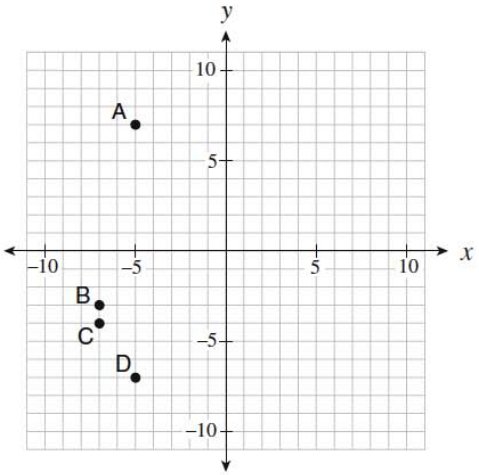
C.



D.



Use the following graph to answer question 69



69. The line $y-2=\frac{1}{2}(x-5)$ passes through which point on the graph?

NC

A. A
B. B
C. C
D. D

70. Determine the slope of the linear relation $3x+5y+15=0$.

A. $\frac{5}{3}$

B. $\frac{3}{5}$

C. $-\frac{3}{5}$

D. $-\frac{5}{3}$

71. Determine the slope-intercept equation of the line that is parallel to $y=\frac{2}{5}x-3$ and passes through the point $(0,\ 5)$.

A. $y=-\frac{5}{2}x-3$

B. $y=-\frac{5}{2}x+5$

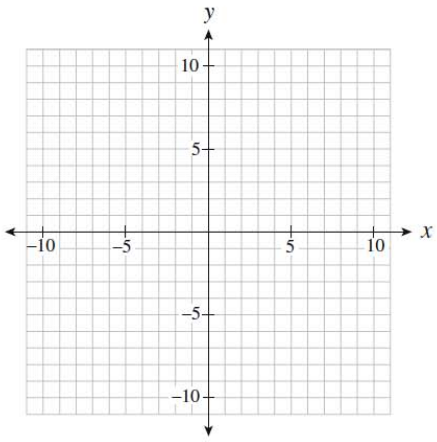
C. $y=\frac{2}{5}x+3$

D. $y=\frac{2}{5}x+5$

72. Lines A and B are perpendicular and have the same x-intercept. The equation of line A is $x+2y-4=0$. Determine the y-intercept of line B.

A. -8
B. -2
C. 4
D. 8

The grid below may be used for rough work to answer question 73



73. A line has a slope of $\frac{2}{3}$ and passes through the point $(6,\ 0)$. Which of the following points must also be on the line?

A. $(-3, -6)$
B. $(3,\ 8)$
C. $(4, -3)$
D. $(9,\ 3)$

74. Rewrite $y = \frac{x}{5} - 6$ in general form.

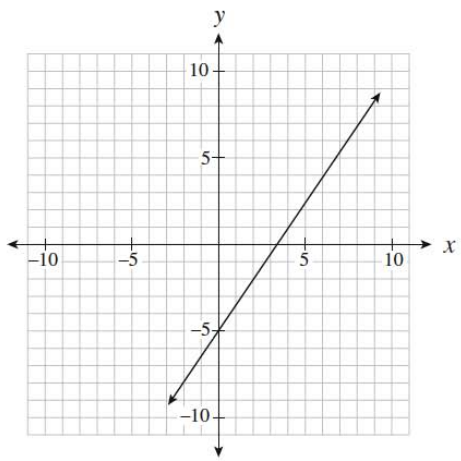
A. $\frac{x}{5} - y - 6 = 0$
B. $x + 5y - 6 = 0$
C. $x - 5y - 30 = 0$
D. $5x - 5y - 30 = 0$

75. Given the equation $Ax + By + C = 0$, which of the following conditions must be true for the graph of the line to have a positive slope and a positive y-intercept?

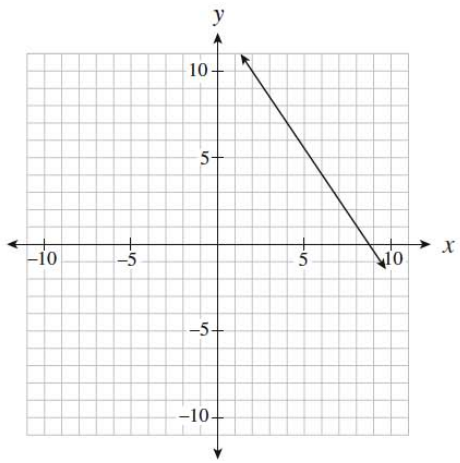
A. $A > 0,\ B > 0,\ C > 0$
B. $A > 0,\ B < 0,\ C > 0$
C. $A > 0,\ B > 0,\ C < 0$
D. $A > 0,\ B < 0,\ C < 0$

76. Which of the following graphs represents a line that passes through $(6,\ 4)$ and is perpendicular to $y = -\frac{2}{3}x$?

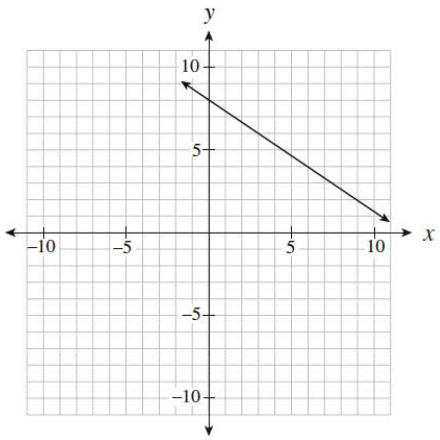
A.



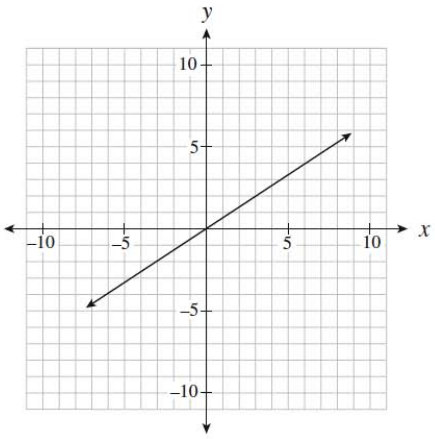
B.



C.



D.



77. Determine the slope-intercept form of the line that passes through the point $(-4,\ 3)$ and is parallel to the line segment that joins $\mathrm{A}(-1,\ -5)$ and $\mathrm{B}(-3,\ 1)$.

A. $y = -3x - 9$
B. $y = -3x + 5$
C. $y = -3x + 15$
D. $y = 3x + 15$

78. Which of the following statements are true for $2x + 3y = 6$?

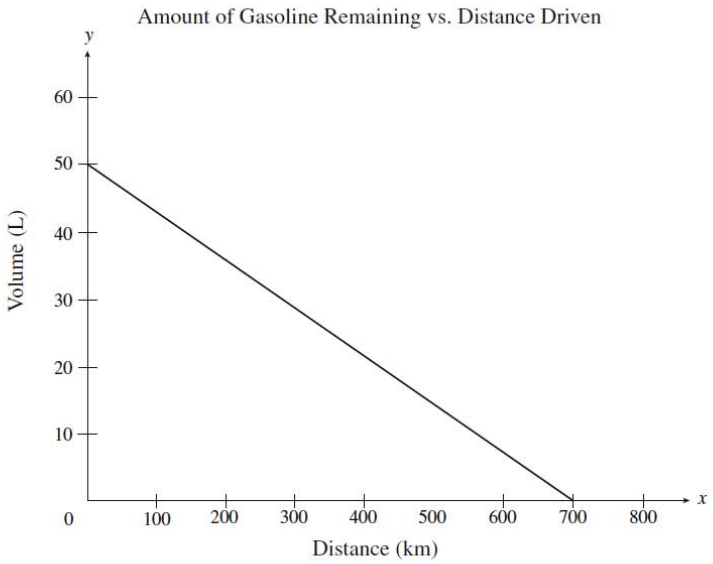
I.	The y-intercept is -2.
II.	The line is parallel to $y = 2x$.
III.	The slope-intercept form of the line is $y = \frac{2}{3}x + 2$.
IV.	The range is all real numbers.

A. IV only
B. I and II only
C. I and IV only
D. III and IV only

79. A hot-dog stand owner makes a profit of \$100 when he sells 90 hot dogs a day. He has a loss of \$30 when he sells 25 hot dogs a day. Which linear relation represents his profit?

A. $y = 0.5x + 55$
B. $y = 1.08x + 3.08$
C. $y = 1.11x$
D. $y = 2x - 80$

Use the following graph to answer question 80



80. The graph above shows the relationship between the amount of gasoline remaining in a 50 L tank and the distance driven for a certain car.

What does the x-intercept represent in this situation?

A. fuel capacity of the gasoline tank
B. total distance travelled during a long trip
C. total distance driven until the car is out of gas
D. number of kilometres driven per litre of gasoline

81. The slope of AB is $-\frac{2}{3}$. The slope of CD is $\frac{w}{24}$. Given AB $\parallel$ CD, determine the value of w.
Answer as an integer.

82. Determine the equation of a line, in slope-intercept form, that passes through the points $(6,\ 1)$ and $(-10,\ 9)$.

NC

A. $y=-\frac{1}{2}x+4$

B. $y=-\frac{1}{2}x-2$

C. $y=-2x+8$

D. $y=-2x+13$

83. Which of the following lines have a negative slope?

I.	$y+3=0$
II.	$2x+y=6$
III.	$(y+2)=-4(x-5)$

A. II only
B. III only
C. I and III only
D. II and III only

84. In which quadrant do the graphs of $x=-7$ and $y=2x+1$ intersect?

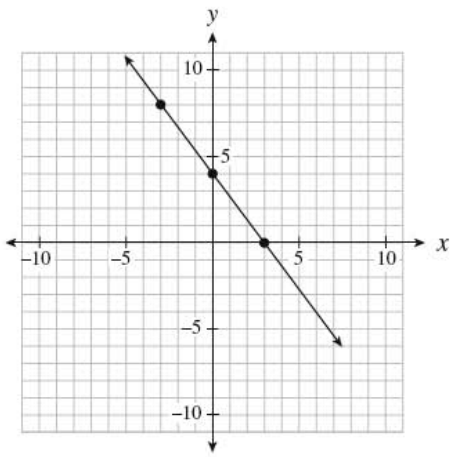
A. Quadrant I
B. Quadrant II
C. Quadrant III
D. Quadrant IV

85. Which of the following coordinates are intercepts of the linear relation $2x - 3y + 30 = 0$?

I.	$(0, 10)$
II.	$\left(0, \frac{2}{3}\right)$
III.	$(-10, 0)$
IV.	$(-15, 0)$

A. I only
B. I and IV only
C. II and III only
D. II and IV only

Use the following graph to answer question 86



86. Which of the following equations describes the linear relation graphed above?

NC

I.	$y = \frac{4}{3}x + 4$
II.	$y - 8 = -\frac{4}{3}(x + 3)$
III.	$4x + 3y - 12 = 0$

A. II only
B. I and II only
C. I and III only
D. II and III only

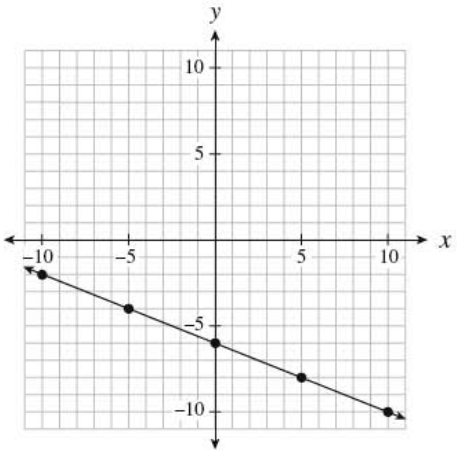
87. Kelly explained her method for graphing the linear relation $y = -\frac{2}{3}x + 7$ as follows:

Steps	
I.	Place a dot on the y-axis at positive 7.
II.	Move up two on the y-axis to positive 9.
III.	From the positive 9, move to the left three spots and place a dot there.
IV.	Draw a line through the two dots.

Where did Kelly make the first mistake in her explanation?

A. Step I
B. Step II
C. Step III
D. There is no mistake.

88. Which of the following relations could be produced by $y = \frac{2}{5}x - 6$?

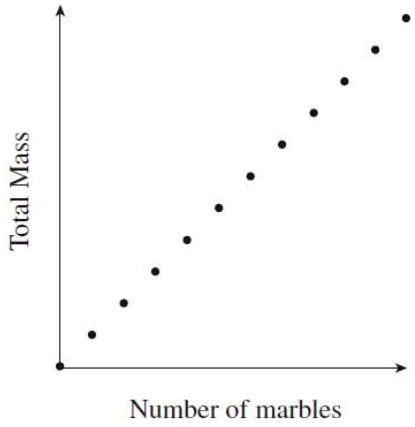
I.	$2x - 5y - 30 = 0$
II.	$\{(15, 0), (10, -2), (-5, -8), (-10, -10)\}$
III.	

A. I only
B. II only
C. I and II only
D. I, II and III

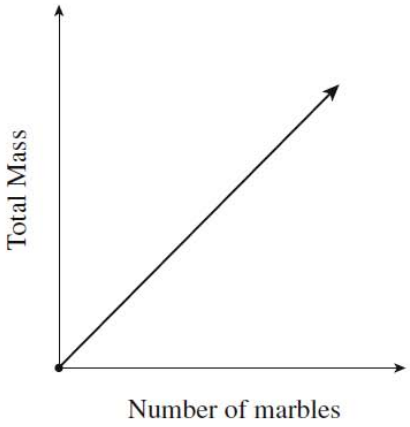
Section 6: Relations and Functions

89. Marbles are placed in a jar one at a time. Which graph below best represents the total mass of the jar and marbles as the marbles are added?

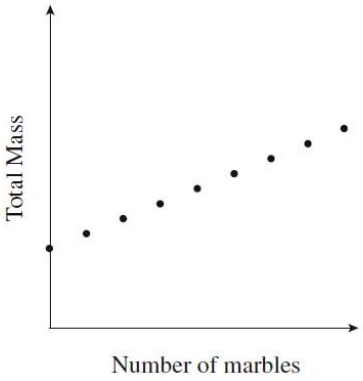
A.



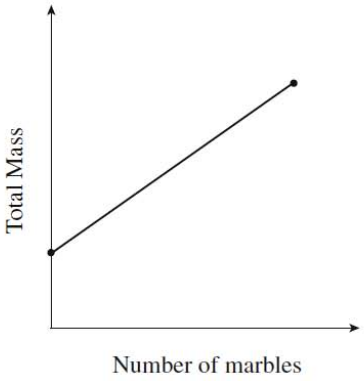
B.



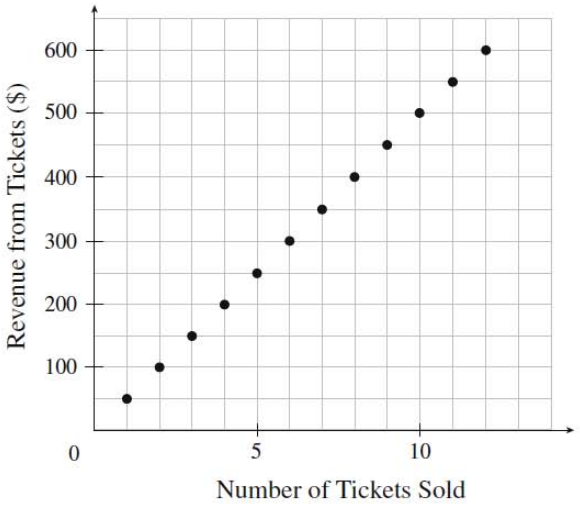
C.



D.



90. What does the slope represent in the graph below?



A. price per ticket
B. profit from tickets
C. revenue from tickets
D. number of tickets sold

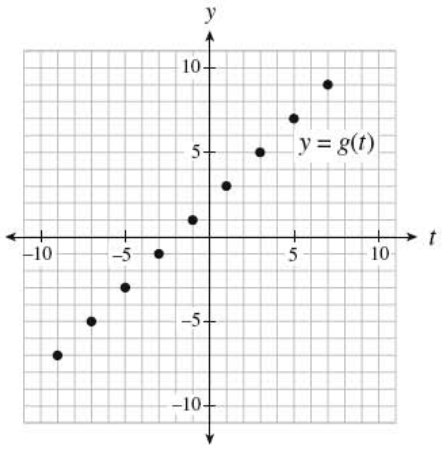
91. The cost C, in dollars, to rent a car is determined by the formula $C(k) = 0.15k + 22$, where k is the number of kilometres driven. Calculate the value of k if $C(k) = 166$. Answer to the nearest kilometre.

92. Damien has a list of 37 potential customers for his house-painting business. In order to get a business grant, he must graph his income versus the number of customers. Determine the domain of the graph.

A. $\{0, 1, 2, 3, \ldots\}$
B. $\{0, 1, 2, 3, \ldots 37\}$
C. all real numbers
D. all real numbers between 0 and 37

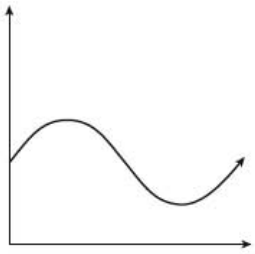
93. A waterslide descends 20 m over a horizontal distance of 50 m. What is the slope of the waterslide? Answer, with a positive value, to the nearest tenth.

94. Given the graph of $y = g(t)$ below, determine the value of t for which $g(t) = -3$. Answer as an integer.

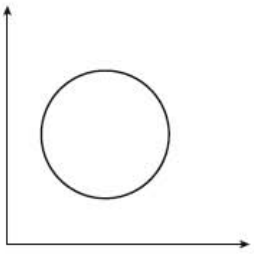


95. Which of the following relations are also functions?

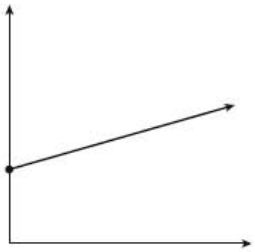
I.



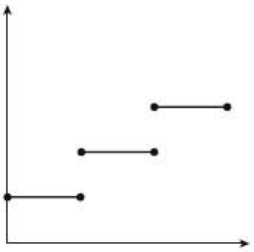
II.



III.

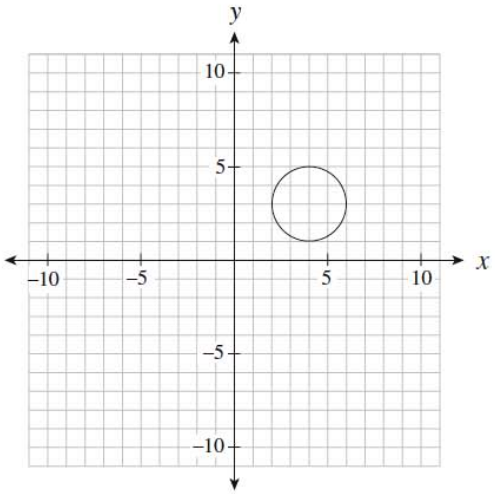


IV.



A. III only
B. I and III only
C. II and IV only
D. I, III and IV only

96. What is the range of the graph below?



I.	All x values between 2 and 6 inclusive.
II.	$(2, 6)$
III.	$[1, 5]$
IV.	$1 \leq y \leq 5$

A. III only
B. IV only
C. I and II only
D. III and IV only

97. Which ordered pair represents $f(3) = -5$?

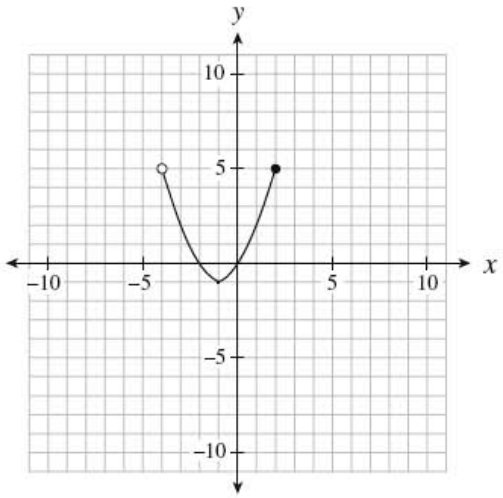
A. $(-5, 3)$
B. $(-3, 5)$
C. $(3, -5)$
D. $(5, -3)$

98. The cost C, in dollars, of renting a hall for the prom is given by the formula $C(n) = 500 + 4n$, where n is the number of students attending the prom. Calculate the cost of renting the hall if 70 students attend.

NC

A. \$108
B. \$500
C. \$780
D. \$970

99. Determine the domain of the relation graphed below.

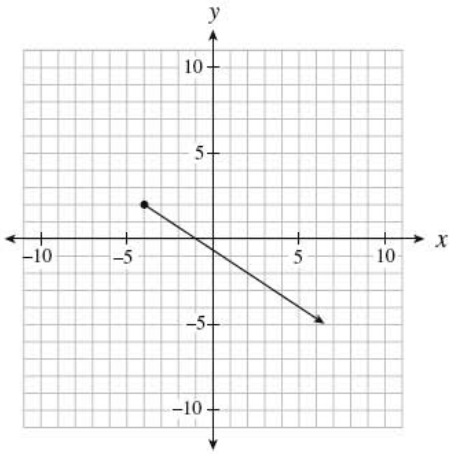


A. $(-4, 2]$
B. $[-4, 2)$
C. $[-1, 5)$
D. $[-1, 5]$

100. Which of the following scenarios is **not** linear?

A. the height of a football thrown over time
B. the total weight of a jar of pennies as more pennies are added
C. the distance travelled by a car moving at a constant speed over time
D. the pay of a truck driver who earns \$2500 a month, plus \$0.50 for every kilometre he drives

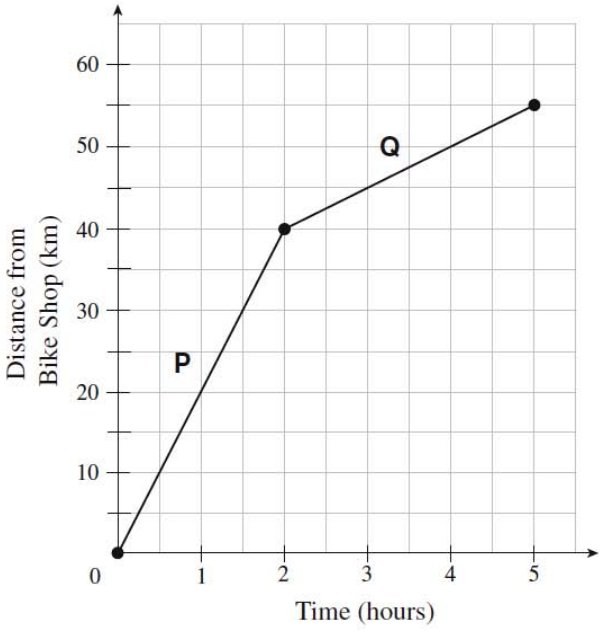
101. Determine the range of the linear relation graphed below.



A. $y \leq -4$
B. $y \leq 2$
C. $y \geq -4$
D. $y \geq 2$

102. The graph below models a bicycle's distance from a bike shop over time.

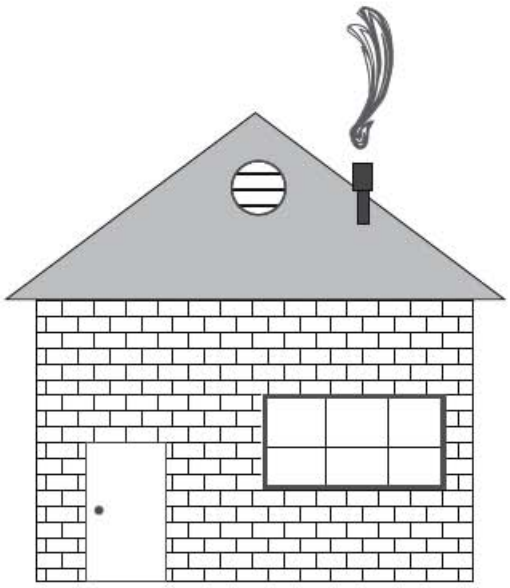
NC



Calculate the change in the speed of the bike from segment P to segment Q.

A. decreased by 15 km/h
B. decreased by 5 km/h
C. increased by 15 km/h
D. increased by 11 km/h

103. Use a ruler to determine the slope of the roof shown below.



Note: This diagram is drawn to scale.

A. $\frac{3}{8}$

B. $\frac{3}{4}$

C. $\frac{4}{5}$

D. $\frac{4}{3}$

104. Calculate the slope between the points $(7, -3)$ and $(4, 3)$.

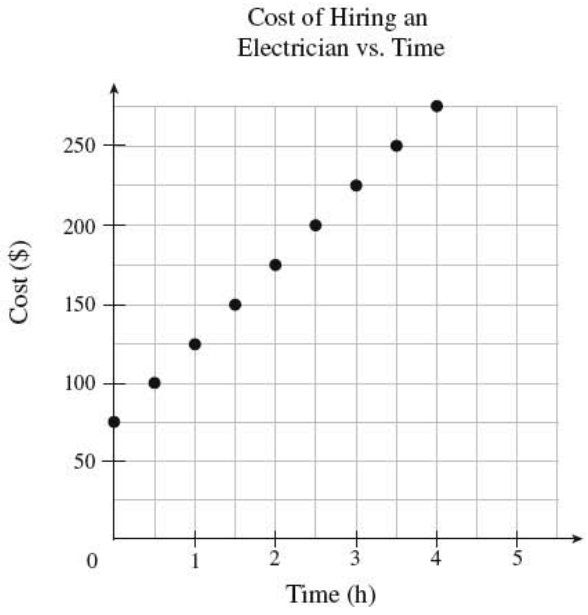
A. -2

B. $-\frac{1}{2}$

C. 2

D. 10

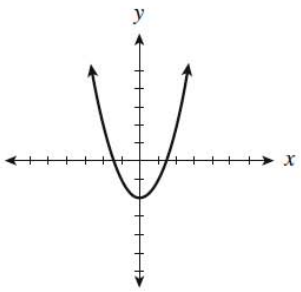
Use the graph below to answer question 105



105. What is the cost of hiring an electrician for 8 hours?

A. $550
B. $475
C. $400
D. $275

106. Which of the following relations are also functions?

I.	$\{(0, 2), (1, 4), (3, 6), (4, 5), (4, 3), (7, -8)\}$
II.	$y = 2x + 5$
III.	The output is 6 more than half the input.
IV.	

A. I only
B. I and IV only
C. II and III only
D. II, III and IV only

107. A line with an undefined slope passes through the points $(-2, 1)$ and (p, q). Which of the following points could be (p, q)?

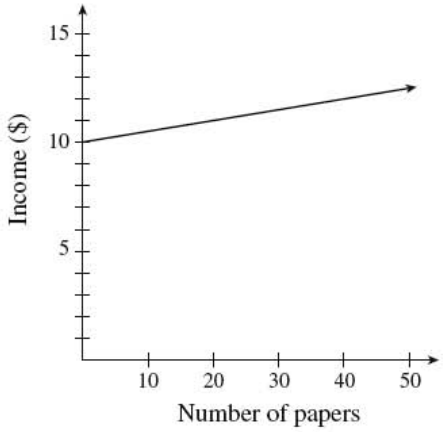
A. $(1, 0)$
B. $(0, 1)$
C. $(0, -2)$
D. $(-2, 0)$

108. Alex bought 144 bagels for $80. His profit was $75 once he had sold 100 bagels. Which equation below represents Alex's profit P, as a function of the number sold, n?

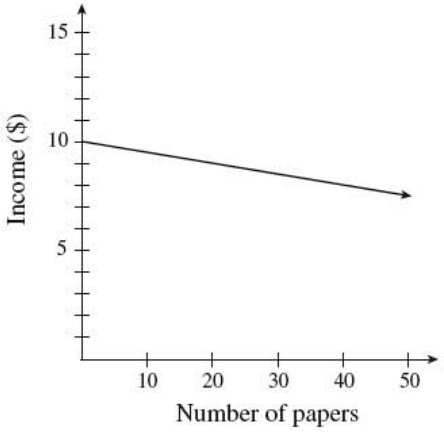
A. $P = -0.05n + 80$
B. $P = 0.05n - 80$
C. $P = 0.75n$
D. $P = 1.55n - 80$

109. Jim delivers newspapers. He gets paid 10 dollars for every day of work, plus 5 cents for every paper he delivers. Which of the following graphs best represents Jim's possible income for one day?

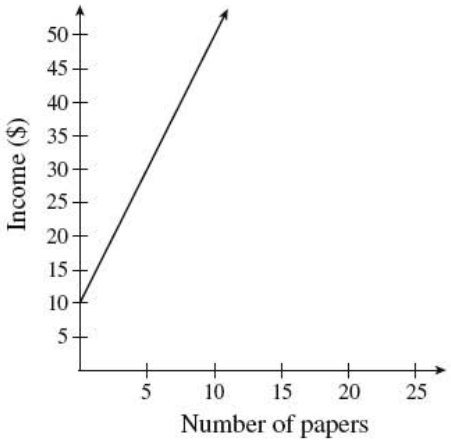
A.



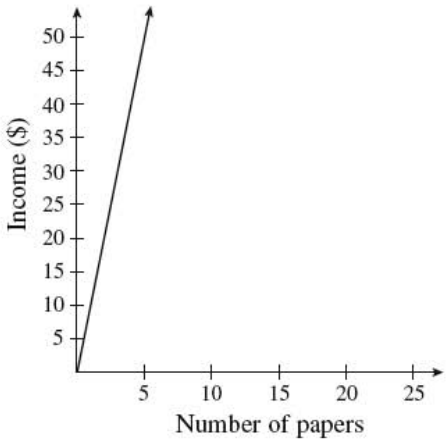
B.



C.



D.



110. The cost to insure jewellery is a fixed amount plus a percentage of the value of the jewellery. It costs $32 to insure $1000 worth of jewellery or $44.50 to insure $3500 worth of jewellery. What is the fixed amount to insure jewellery?

A. $27.00
B. $31.25
C. $44.65
D. $58.82

Section 7: Solving Systems of Linear Equations

111. A package of 12 hex bolts and 10 anchor bolts weighs 7 pounds. A second package of 5 hex bolts and 15 anchor bolts weighs 4 pounds. How much does a single hex bolt weigh? Answer in pounds to one decimal place.

112. Solve for y in the following system of equations:

NC

$$x - y = -1$$
$$3x + 5y = 21$$

A. 2
B. 3
C. 9
D. 12

113. Which of the following systems of linear equations has a solution of $(-3, 4)$?

A. $\begin{cases} 2x - 3y = 6 \\ y = 3x - 13 \end{cases}$

B. $\begin{cases} 2x - 3y = 6 \\ y = 3x + 13 \end{cases}$

C. $\begin{cases} 2x + 3y = 6 \\ y = 3x - 13 \end{cases}$

D. $\begin{cases} 2x + 3y = 6 \\ y = 3x + 13 \end{cases}$

114. Two planes have a cruising speed of 570 km/h without wind. The first plane flies for 12 hours against a constant headwind. The second plane flies for 10 hours in the opposite direction with the same wind (a tailwind). The second plane flies 370 km less than the first plane.

Determine two equations that could be used to solve for the wind speed, w, and the distance travelled by the first plane, d.

A. $(570-w)(12)=d$
$(570+w)(10)=d-370$

B. $(570-w)(12)=d$
$(570+w)(10)=d+370$

C. $(570+w)(12)=d$
$(570-w)(10)=d-370$

D. $(570+w)(12)=d$
$(570-w)(10)=d+370$

115. How many solutions does this system of equations have?

NC

$$y=3x+7$$
$$y=3x-4$$

A. no solution
B. one solution
C. an infinite number of solutions
D. cannot be determined without solving

116. Solve for x:

$$3x+4y=-16$$
$$x=4y$$

117. How many solutions does this system of equations have?

$$y=3x+7$$
$$y=3x-4$$

A. no solution
B. one solution
C. an infinite number of solutions
D. cannot be determined without solving

118. Solve the following system of equations:

NC

$$4x + 2y = 8$$
$$-3x + y = -1$$

A. $(-3, 10)$
B. $(-1, 6)$
C. $(1, 2)$
D. $(3, 2)$

119. Kim invested a total of $1500 between two bonds. One bond earned 8% per annum and the other bond earned 10% per annum. In one year, Kim earned $132 on her investments. How much did she invest in the bond that earned 10%?

A. $600
B. $750
C. $900
D. $1000

120. Joey bought 8 books. Some books cost $12 each the rest cost $18 each. He spent a total of $108. Which of the following systems of linear equations could represent the given situation?

A. $x + y = 8$
$12x + 18y = 108$

B. $x + y = 108$
$12x + 18y = 8$

C. $x + 12y = 8$
$x + 18y = 108$

D. $12x + y = 8$
$x + 18y = 108$

Final Exam Review

Section 1: Polynomials

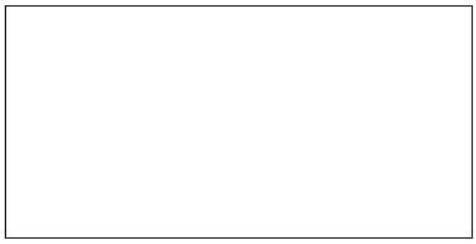
NOTE: NC = Non-Calculator Section

1. Which two numbers have the following properties?
   - Their GCF is 12. Greatest common Factor
   - Their LCM is 72. Lowest common Multiple

   A. ~~2 and 3~~
   B. 24 and 36
   C. ~~48 and 72~~
   D. ~~72 and 864~~

   24, 48, 72, ... 36, 72...
   48, 96...

2. Given that the area of the rectangle below is $2x^2+9x-5$, determine the length of the rectangle.



length

$x+5$

mult -10, add +9x

Factor $2x^2+9x-5$

$(2x^2+10x)(-x-5)$

$2x(x+5)-(x+5)$

$(x+5)(2x-1)$

width, length

   A. $2x-1$
   B. $2x+1$
   C. $2x+9$
   D. $2x^2+8x-10$

3. Expand and simplify: $(x-4)^3$

$(\ )(x-4)(x-4)$

$(x-4)(x^2-4x-4x+16)$

$(x-4)(x^2-8x+16)$

x^3-8x^2+16x
$-4x^2+32x-64$
$x^3-12x^2+48x-64$

   A. $x^3-12x^2+48x-64$
   B. $x^3+12x^2+48x+64$
   C. $x^3-4x^2+16x+64$
   D. x^3-64

4. Katie simplified the expression $(x+b)(x+c)$, where $b<0$ and $c<0$, to the form x^2+gx+k. What must be true about g and k?

   A. $g<0$ and $k>0$
   B. $g<0$ and $k<0$
   C. $g>0$ and $k>0$
   D. $g>0$ and $k<0$

eg. $(x-3)(x-5)$

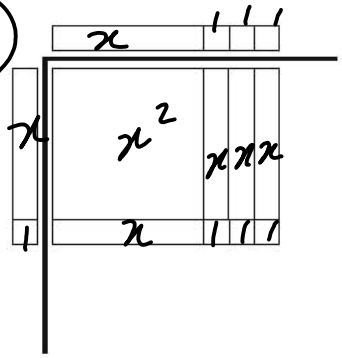
$x^2-5x-3x+15$

$x^2-8x+15$

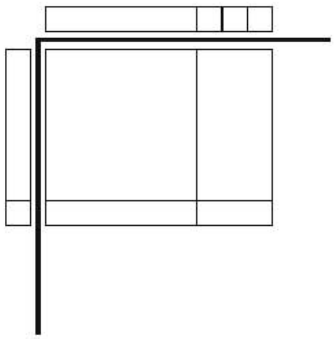
$g<0$ $k>0$

5. Which of the following diagrams best represents the expansion of $(x+3)(x+1)$ pictorially?

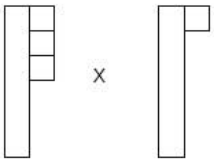
A.



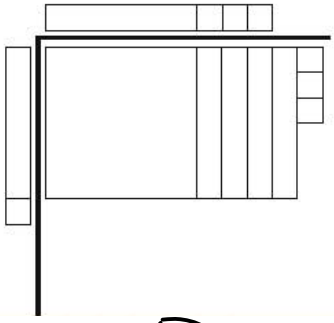
B.



C.



D.



6. How many integer values are there for k for which $4x^2 + kxy - 9y^2$ is factorable?

add 36

9 values of K

K=0 if $(2x-3y)(2x+3y)$

K=-16 if $(2x-9y)(2x+1y)$

K=16 if $(2x+9y)(2x-1y)$

K=-9 if $(4x+3y)(x-3y)$

K=9 if $(4x-3y)(x+3y)$

K=5 if $(4x+9y)(x-1y)$

K=-5 if $(4x-9y)(x+1y)$

K=-35 if $(4x+y)(x-9y)$

K=35 if $(4x-y)(x+9y)$

Difference of Squares

7. Factor: $y^2 - 81$

$(y+9)(y-9)$

A. $(y-9)^2$
B. $(y+9)^2$
C. $(y+9)(y-9)$
D. $(y+3)(y-3)(y+9)$

8. Which of the following expressions have a factor of $x+2$?

I.	x^2-4
II.	$2x^2-x-10$
III.	$5x+10$

diff of squares $(x+2)(x-2)$ ✓

$(2x^2-5x)(+4x-10)$

$x(2x-5)+2(2x-5)$

$(2x-5)(x+2)$ ✓

$5(x+2)$ ✓

A. I only
B. III only
C. I and III only
D. I, II and III

9. Expand and simplify: $(4x-3)^2$

$(4x-3)(4x-3)$ Distributive Law

$4x(4x-3) \quad -3(4x-3)$

$16x^2-12x$

$-12x+9$

$16x^2-24x+9$

A. $16x^2+9$
B. $16x^2-12x+9$
C. $16x^2-24x-9$
D. $16x^2-24x+9$

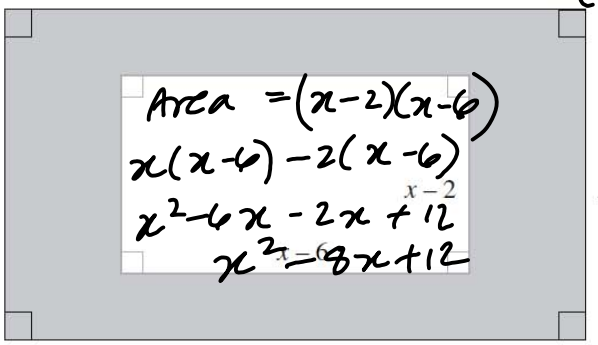
10. Pam expanded and simplified $(x-3)(x^2+2x-4)$, as shown below.

Steps	
I.	$x(x^2+2x-4)-3(x^2+2x-4)$ negative
II.	$x^3+2x^2-4x-3x^2+6x-12$ positive
III.	$x^3-x^2+2x-12$

In which step is Pam's first error?

A. Step I
B. Step II
C. Step III
D. There is no mistake.

11. Determine an expression to represent the shaded area below.



LARGE RECT.
$(x+5)(2x+11)$
$x(2x+11) + 5(2x+11)$
$2x^2 + 11x + 10x + 55$
$2x^2 + 21x + 55$

Subtract $2x^2+21x+55 - (x^2-8x+12)$
$x^2 + 29x + 43$

A. x^2+43
B. $x^2+13x+67$
C. $x^2+29x+43$
D. $3x^2+13x+67$

12. Determine the greatest common factor of $12x^5y$, $4x^3y^2$ and $6x^2y^4$.

$2x^2y$ use smallest exponent on a shared variable factor

A. $2xy$
B. $2x^2y$
C. $4x^3y^2$
D. $12x^5y^4$

13. Which of the following expressions is a factor of $x^2-8x-20$?

mult to -20
add to -8
$(x-10)(x+2)$

A. $x-2$
B. $x-4$
C. $x-5$
D. $x-10$

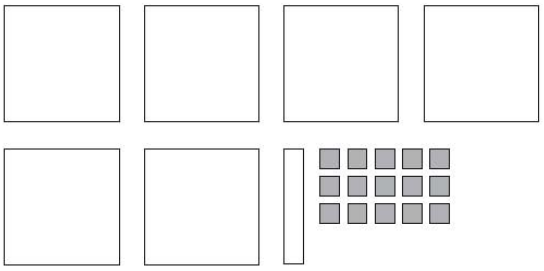
14. When completely factored, how many factors does $2x^4-24x^2-128$ have?

mult to -64, add -12

$2(x^4-12x^2-64)$
$2(x^2-16)(x^2+4)$
$2(x+4)(x-4)(x^2+4)$

A. 2
B. 3
C. 4
D. 5

15. Joe was asked to factor $6x^2 + x - 15$ and represent it with math tiles.



What additional tiles would he need to represent the total area of the two factors?

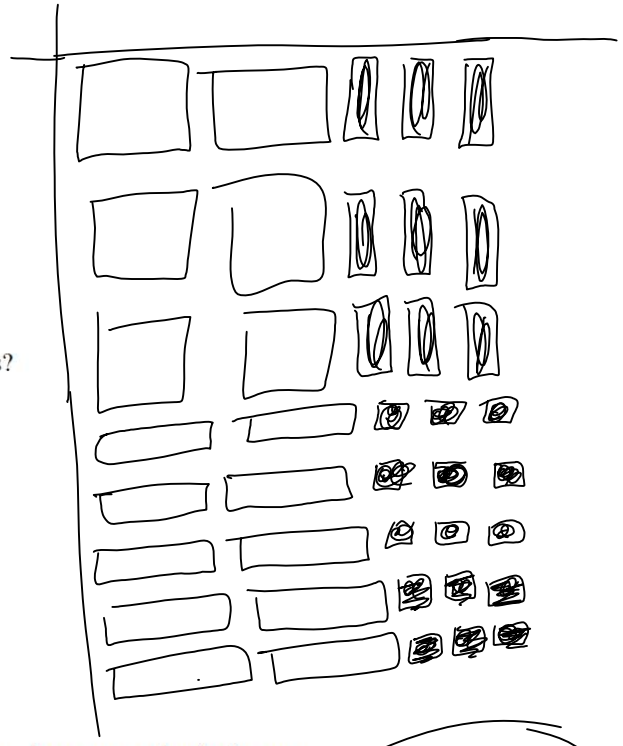
A. 8 each of ▭ and ▬

B. 9 each of ▭ and ▬ ✓✓

C. 10 each of ▭ and ▬

D. 11 each of ▭ and ▬

create a rectangle ↗



16. A bacteria culture doubles every hour. If there are 10 000 bacteria now, how many bacteria were there 4 hours ago? Answer to the nearest bacterium.

10000 now → 1 hr ago 5000 → 2 hrs ago 2500 → 3 hrs ago 1250 → 4 hrs ago 625

$\times \frac{1}{2}$ $\times \frac{1}{2}$ $\times \frac{1}{2}$ $\times \frac{1}{2}$

or $(10000)\left(\frac{1}{2}\right)^4$

Section 2: Exponents and Radicals

17. What is the least common multiple of 18 and 24?

NC A. 2×3

B. $2^2 \times 3^3$

C. $2^3 \times 3^2$

D. $2^4 \times 3^3$

$2 \cdot 3^2$ $8 \cdot 3$

$2^3 \cdot 3$

L.C.M. is $2^3 \cdot 3^2$ (take each prime factor to its highest exponent)

18. What is the greatest common factor of 12, 24, 30, 72?

NC A. 360

B. 12

C. 6

D. 2

6 6

$72 = 36 \cdot 2$

$24 \cdot 3$

$18 \cdot 4$

$12 \cdot 6$

$9 \cdot 8$

$30 = 15 \cdot 2$

$10 \cdot 3$

$6 \cdot 5$

19. . Express $2\sqrt{5}$ as an entire radical.

NC

A. $\sqrt{10}$
B. $\sqrt{20}$
C. $\sqrt{50}$
D. $\sqrt{100}$

$(\sqrt{4})(\sqrt{5})$

$\sqrt{4 \cdot 5} = \sqrt{20}$

20. Order the numbers from the smallest value to the largest value.

NC

I.	$-3\sqrt{2}$
II.	$\sqrt{9}$
III.	$2\sqrt{3}$
IV.	$-2\sqrt{7}$

$-(\sqrt{9})(\sqrt{2}) = -\sqrt{18}$ smallest

$\sqrt{9}$ 2nd largest

$(\sqrt{4})(\sqrt{3}) = \sqrt{12}$ largest

$-(\sqrt{4})(\sqrt{7}) = -\sqrt{14}$ 2nd smallest

A. I, IV, II, III
B. I, IV, III, II
C. IV, I, II, III
D. IV, I, III, II

21. Simplify: $(2x^3)^3 \cdot 3x^4$

NC

A. $24x^{36}$
B. $24x^{13}$
C. $18x^{36}$
D. $6x^{13}$

$(2^3x^9)(3x^4)$

$(8x^9)(3x^4)$

$24x^{13}$

22. Which one of the following sets of numbers contains only rational numbers?

A. $\left\{-\frac{3}{4}, 7.1, \sqrt{16}\right\}$

$\sqrt{}$ of a perfect square is rational

Rationals—
- can be written as $\frac{m}{n}$, $n \neq 0$
- decimal either repeats or ends

B. $\left\{\frac{1}{2}, -6, \frac{\sqrt{5}}{2}\right\}$

C. $\{-3, 4.\overline{23}, 4.121314\ldots\}$

D. $\{\sqrt{10}, 3\sqrt{9}, \pi\}$

23. Simplify: $\sqrt[3]{1080}$

$\sqrt[3]{1080} = (\sqrt[3]{216})\sqrt[3]{5}$

$6\sqrt[3]{5}$

A. $2\sqrt[3]{135}$
B. $3\sqrt[3]{40}$
C. $6\sqrt[3]{5}$
D. $6\sqrt[3]{30}$

24. Simplify: $(3a^2)^3(4a^3)^0$

$(3^3a^6)(1)$

$3\cdot3\cdot3$

$27a^6$

A. $9a^6$
B. $27a^6$
C. $36a^8$
D. $108a^9$

25. Which expression is equivalent to $(-c^2)^{-\frac{1}{3}}$?

$\left(\frac{1}{-c^2}\right)^{\frac{1}{3}} = \frac{1}{\sqrt[3]{-c^2}}$

A. $\frac{1}{\sqrt[3]{-c^2}}$
B. $\frac{1}{\sqrt[3]{c^2}}$
C. $\frac{1}{\sqrt{-c^3}}$
D. $\sqrt[3]{c^2}$

26. Simplify: $\sqrt{x^3} \div \sqrt[3]{x^4}$

$x^{\frac{3}{2}} \div x^{\frac{4}{3}}$

$x^{\frac{3}{2}-\frac{4}{3}}$

$x^{\frac{9}{6}-\frac{8}{6}}$

$x^{1/6} \longrightarrow \sqrt[6]{x}$

A. $\sqrt[6]{x}$
B. $\sqrt[8]{x^9}$
C. $\sqrt[9]{x^8}$
D. $\sqrt[12]{x}$

27. Which of the following statements are true?

NC

I.	$\sqrt{4} = 2$ since $2 \times 2 = 4$
II.	$\sqrt{8} = 4$ since $4 + 4 = 8$
III.	$\sqrt[3]{27} = 3$ since $3 \times 3 \times 3 = 27$
IV.	$\sqrt[3]{81} = 9$ since $9 \times 9 = 81$

$\sqrt{8} = \sqrt{4} \cdot \sqrt{2} = 2\sqrt{2}$

$\sqrt[3]{81} = \sqrt[3]{27 \cdot 3} = 3\sqrt[3]{3}$

A. I and III only
B. I and IV only
C. II and III only
D. II and IV only

28. Which of the following statements are true?

NC

I.	The factors of 24 are 2, 3, 4, 6, 8 and 12.
II.	The prime factorization of 24 is $2^3 \times 3^1$.
III.	The prime factors of 24 are 2 and 3.
IV.	$\sqrt{24}$ is an irrational number.

because 24 is not a perfect square

A. I and IV only
B. II and III only
C. II, III and IV only
D. I, II, III and IV

29. Simplify: $\sqrt{72}$

$\sqrt{72} = \sqrt{36}\sqrt{2}$

$6\sqrt{2}$

NC

A. $2\sqrt{6}$
B. $6\sqrt{2}$
C. $18\sqrt{2}$
D. $36\sqrt{2}$

30. Evaluate: $16^{-\frac{3}{4}}$

$\left(\frac{1}{16}\right)^{\frac{3}{4}}$

$\left(\sqrt[4]{\left(\frac{1}{16}\right)}\right)^3 = \left(\frac{1}{2}\right)^3 = \frac{1^3}{2^3} = \frac{1}{8}$

A. -8
B. $\frac{1}{8}$
C. $\frac{1}{2}$
D. 2

31. Which pattern could be used to predict 3^{-4}?

NC

A.

3^3	27
3^2	9
3^1	3
3^0	1
3^{-1}	$\frac{1}{3}$
3^{-2}	$\frac{1}{9}$
3^{-3}	$\frac{1}{27}$
3^{-4}	$\frac{1}{81}$

÷ 3 each step

exponent decreases by 1

B.

3^3	9
3^2	6
3^1	3
3^0	0
3^{-1}	$-\frac{1}{3}$
3^{-2}	$-\frac{1}{6}$
3^{-3}	$-\frac{1}{9}$

incorrect

$3^{-1} = \frac{1}{3}$

C.

3^3	27
3^2	9
3^1	3
3^0	1
3^{-1}	−3
3^{-2}	−9
3^{-3}	−27

incorrect

$3^{-1} = \frac{1}{3}$

D.

3^3	9
3^2	6
3^1	3
3^0	0
3^{-1}	−3
3^{-2}	−6
3^{-3}	−9

32. Which of the following number lines best represents the placement of X, Y, Z, given:

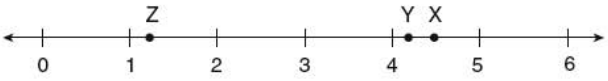
4.47 $X = 2\sqrt{5}$

4.08 Y = cube root of 68

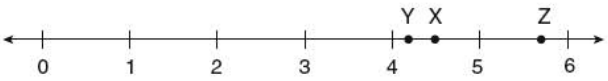
1.19 $Z = \sqrt[4]{2}$

use calc

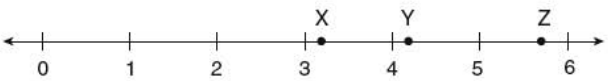
A.



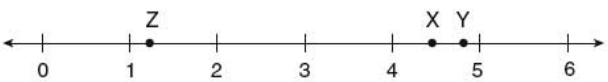
B.



C.



D.



33. Chantal made a mistake in her simplification of $\frac{(3a^5)^{-2}}{a^4}$.

Steps	
I.	$\frac{1}{(3a^5)^2(a^4)}$
II.	$\frac{1}{(3)^2(a^5)^2(a^4)}$
III.	$\frac{1}{(9)(a^7)(a^4)}$
IV.	$\frac{1}{9a^{28}}$

$\frac{1}{(3a^5)^2(a^4)}$

$\frac{1}{3^2(a^5)^2(a^4)}$

$\frac{1}{9(a^{10})a^4}$

Which step contains her first mistake?

A. Step I
B. Step II
C. Step III
D. Step IV

34. Simplify: $\left(\frac{25x^a}{125x^3}\right)^3$

$\left(\frac{1x^a}{5x^3}\right)^3 = \frac{1x^{3a}}{5^3x^9} = \frac{x^{3a-9}}{5}$

A. $\frac{x^{3a-9}}{125}$

B. $\frac{x^{a-3}}{5}$

C. $125x^{3a-9}$

D. $\frac{x^{27a}}{5}$

35. A research assistant calculated the brain mass, b, of an 8 kg cat. She used the formula $b = 0.01m^{\frac{2}{3}}$, where m is the total mass of the cat.

Steps	
I.	$b = 0.01\sqrt[3]{8^2}$
II.	$b = 0.01\sqrt[3]{16}$
III.	$b \approx 0.01(2.52)$
IV.	$b \approx 0.025$

$b = .01(8)^{2/3}$

$\leftrightarrow b = .01(\sqrt[3]{8^2})$ ✓

$b = .01\sqrt[3]{64}$

In which step did the research assistant first make a mistake?

A. Step I
B. Step II
C. Step III
D. Step IV

Section 3: Measurement and Surface Area

36. A road sign says to turn right in 1000 feet. Approximately how far is this distance in kilometres?

NC A. 0.3 km
B. 0.6 km
C. 1 km
D. 1.5 km

$\frac{1000\text{ ft}}{x\text{ m}} = \frac{3\text{ ft}}{1\text{ m}}$

$1000 \div 3 \approx 333\text{ m}$ or $.3\text{km}$

37. Which of the following calculations converts 4 yards into centimetres?

NC A. $4\text{ yd} \times \frac{2.54\text{ cm}}{1\text{ in}}$

B. $4\text{ yd} \times \frac{3\text{ ft}}{1\text{ yd}} \times \frac{2.54\text{ cm}}{1\text{ ft}}$

C. $4\text{ yd} \times \frac{3\text{ ft}}{1\text{ yd}} \times \frac{12\text{ in}}{1\text{ ft}} \times \frac{2.54\text{ cm}}{1\text{ in}}$ ✓

D. $4\text{ yd} \times \frac{1\text{ ft}}{3\text{ yd}} \times \frac{1\text{ in}}{12\text{ ft}} \times \frac{1\text{ cm}}{2.54\text{ in}}$

38. A cylinder with a diameter of 10 cm and a height of 12 cm is half full of water. A sphere with a diameter of 5 cm is dropped into the cylinder. How far will the water level rise once the sphere is completely under the water?

A. 0.57 cm
B. 0.83 cm
C. 5 cm
D. 6 cm

$V_{cyl} = \pi(5)^2(6) = 471.2389$

$V_{sphere} = \frac{4}{3}\pi(2.5)^3 = 65.4498$

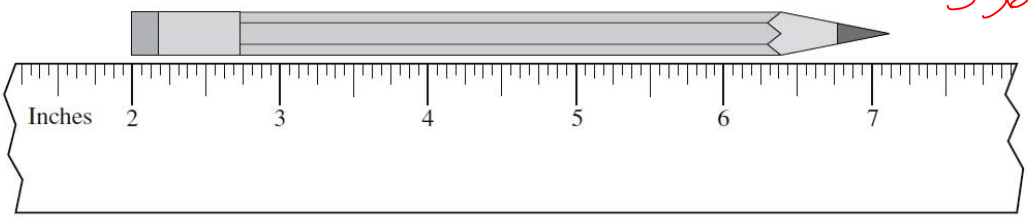
$V_{filled\ now} = 536.6887$

$536.6887 = \pi(5^2)h$

$\frac{536.6887}{\pi(25)} = h$

$6.833 = h\ (new)$
$-6\ old\ height$
$.833\ rise$

39. Using the ruler below, determine the length of the pencil.



A. $5\frac{1}{8}$"
B. 5.2"
C. $5\frac{1}{4}$"
D. $7\frac{1}{8}$"

$7\frac{1}{8} - 2$

$= 5\frac{1}{8}$

40. Jung was told to plant trees two steps apart. Which of the following estimates is closest to "two steps apart"?

A. 6 ft
B. 3 m
C. 60 cm
D. 30 in

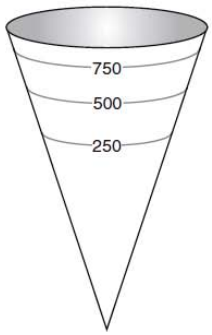
41. Which distance below is the longest?

0.6 mi,	1000 yd,	1 km,	900 m
965 m	914 m	1000 m	900 m

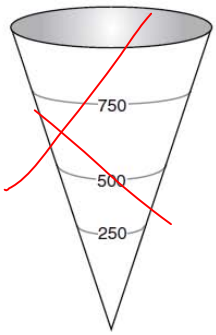
A. 0.6 mi
B. 1000 yd
C. 1 km
D. 900 m

42. A cone-shaped water tank has a volume of 1000 litres. Which diagram best represents the 250 L, 500 L and 750 L marks outside of the water tank?

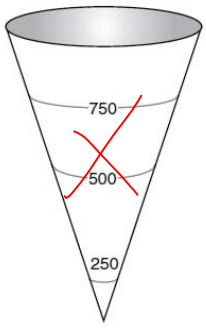
A.



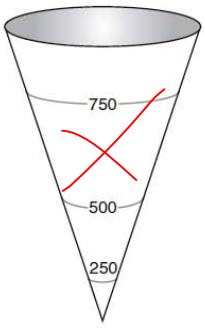
B.



C.

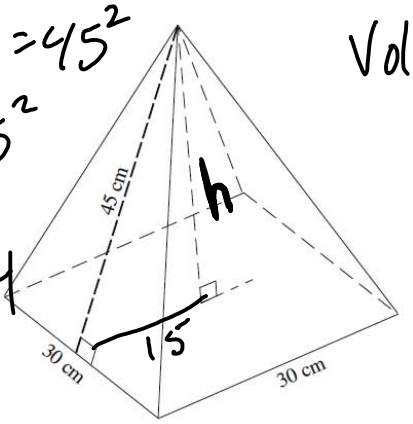


D.



the first 250 mL will rise higher up edge because the diameter is increasing up the cone

43. The slant height of the pyramid below is 45 cm. Calculate its volume.



$height^2 + 15^2 = 45^2$

$h^2 = 45^2 - 15^2$

$h^2 = 1800$

$h = 42.4264$

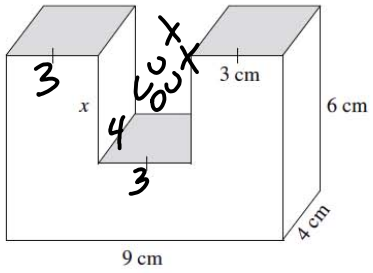
$Volume = \frac{1}{3}(Area\ base)\ height$

$= \frac{1}{3}(30 \times 30)\ 42.4264$

$V = 12727.922\ cm^3$

A. 10 062 cm^3
B. 12 728 cm^3
C. 13 500 cm^3
D. 40 500 cm^3

44. The volume of the object below is 186 cm^3. Calculate the length of x.



Volume before cut out

$V = 9 \times 4 \times 6 = 216$

$V_{cutout} = 216 - 186$

$V_{cutout} = 30$

$3 \cdot 4 \cdot x = 30$

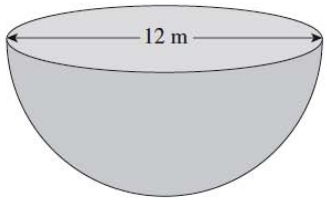
$L \cdot w \cdot h$

$12x = 30$

$x = \frac{30}{12} = 2.5$

A. 3.1 cm
B. 2.5 cm
C. 1.75 cm
D. 1.25 cm

45. Calculate the surface area of the solid hemisphere below. Answer to the nearest square metre.



$SA_{sphere} = \frac{4\pi r^2}{2}$ ← $\frac{1}{2}$ $+$ SA_{circle} $\pi(r)^2$

$Total_{SA} = \frac{4\pi(6)^2}{2} + \pi(6)^2$

$SA = 226.1947 + 113.0973$

$SA = 339$

46. On a quiz, students were asked to convert 5 lbs 4 oz to a metric weight.

	Stan's Solution	Erin's Solution
Step 1	$4\text{ oz} \times \frac{1\text{ lb}}{16\text{ oz}} = 0.25\text{ lb}$	$5\text{ lb} \times \frac{16\text{ oz}}{1\text{ lb}} = 80\text{ oz}$
Step 2	$5.25\text{ lb} \times \frac{0.454\text{ kg}}{1\text{ lb}} \approx 2.3835\text{ kg}$	$84\text{ oz} \times \frac{28.35\text{ g}}{1\text{ oz}} \approx 2381.4\text{ g}$

How should the teacher mark these two solutions?

A. Only Erin's solution is correct.
B. Only Stan's solution is correct.
C. Both Stan and Erin gave a correct solution.
D. Neither Stan nor Erin gave a correct solution.

47. A baker gets his muffin boxes from the United States. The tallest muffins he bakes are 11 cm. Estimate the height of the smallest box in which the muffins will fit.

NC

A. 30 inches tall } too big
B. 10 inches tall
C. 5 inches tall → $5 \times 2.54 = 12.7\text{ cm}$
D. 4 inches tall $4 \times 2.54 = 10.16\text{ cm}$

48. Jasdeep and Kelsey converted 177 ounces into kilograms, as shown below.

NC

Jasdeep's Solution	Kelsey's Solution
$177\text{ oz} \times \frac{28.35\text{ g}}{1\text{ oz}} \times \frac{1\text{ kg}}{1000\text{ g}} = 5\,017\,950\text{ kg}$	$177\text{ oz} \times \frac{1\text{ oz}}{28.35\text{ g}} \times \frac{1\text{ kg}}{1000\text{ g}} = 0.0062\text{ kg}$

right steps, wrong answer — wrong steps

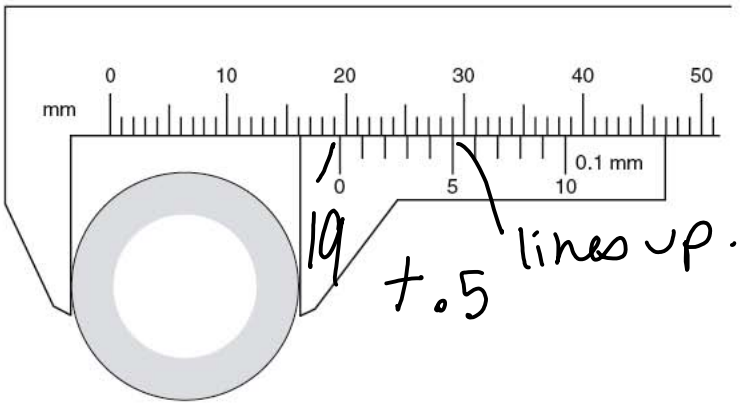
Which statement below is true?

A. Only Kelsey is correct because the units cancel.
B. Only Jasdeep is correct because the units cancel.
C. Only Kelsey is incorrect because the conversion factors are incorrect.
D. They are both incorrect for different reasons.

49. As an estimation strategy, what could be used to best approximate one centimetre?

A. the length of your foot
B. the width of your hand
C. the width of your finger
D. the width of a pencil lead

50. Sarah needs to replace the exhaust pipe on her dirt bike. She uses a Vernier calliper to find the diameter of the pipe.



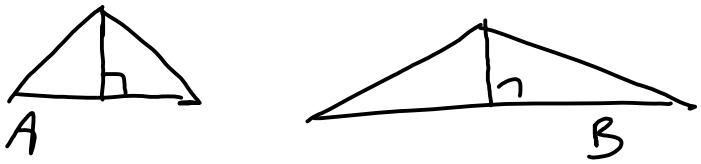
What is the diameter of the pipe?

A. 16.1 mm
B. 19.2 mm
C. 19.5 mm
D. 29.0 mm

51. Two isosceles triangles have the same height. The slopes of the sides of triangle A are double the slopes of the corresponding sides of triangle B. How do the lengths of their bases compare?

use grid paper, sketch.

A. The base of A is quadruple that of B.
B. The base of A is double that of B.
C. The base of A is half that of B.
D. The base of A is one quarter that of B.



52. A cylinder has a surface area of 402 cm^2. The height is three times greater than the radius. What is the height of the cylinder?

A. 8.00 cm
B. 10.48 cm
C. 12.00 cm
D. 16.97 cm

$\frac{402}{8\pi} = r^2$

$SA = 2\pi r^2 + 2\pi rh$

$402 = 2\pi r^2 + 2\pi r(3r)$

$402 = 2\pi r^2 + 6\pi r^2$

$402 = 8\pi r^2$

height = 3 times $\sqrt{16} = r$

$4 = r$

$= 12$

53. A bowling ball measures 264 cm in circumference. What is the volume of the smallest cube that will hold this ball?

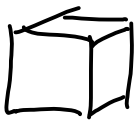
A. approximately 75 000 cm^3
B. approximately 311 000 cm^3
C. approximately 594 000 cm^3
D. approximately 2 300 000 cm^3

$C = \pi d$

$264 = \pi d$

$\frac{264}{\pi} = d$

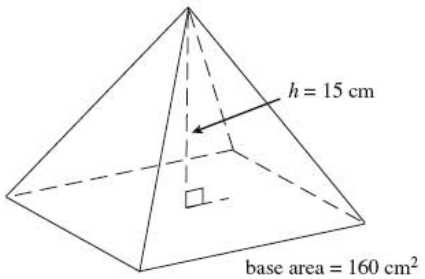
$84.0338 = d$



if $d = 84$ then cube side $= 84$

so volume $\approx (84)^3 = 593419$

54. Which of the following shapes has a volume three times larger than the pyramid below?



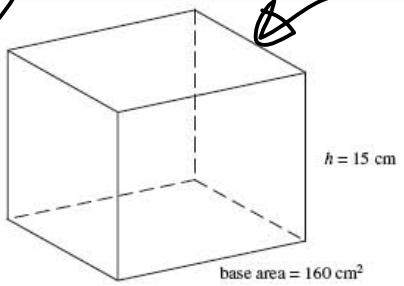
$V = \frac{1}{3}(\text{area base})\,ht$

$(160)\ (15)$

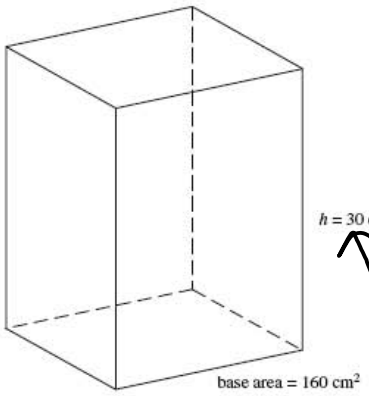
for 3 times need $V = (\text{area base})\,ht$

$(160)\quad (15)$

A.

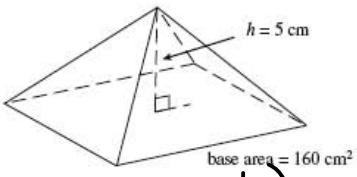


B.



no

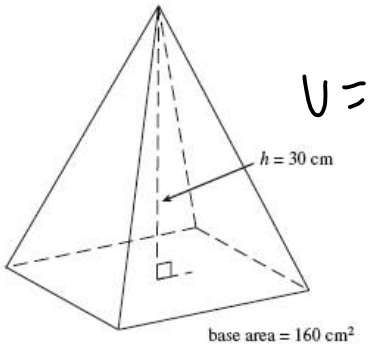
C.



$V = \frac{1}{3}(160)(5)$

no

D.



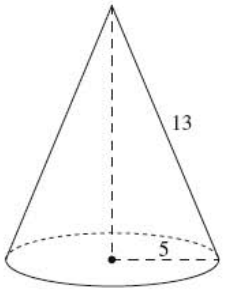
$V = \frac{1}{3}(160)(30)$

no

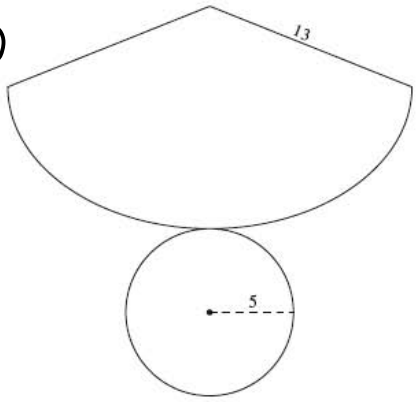
55. Convert 150 pounds into kilograms. Answer to the nearest kilogram.

$150\ \text{lbs} \times \frac{0.454\ \text{kg}}{1\ \text{lbs}} \approx 68\ \text{kg}$

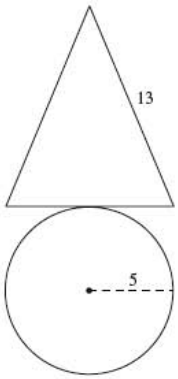
56. Which of the following net diagrams best constructs the cone below?



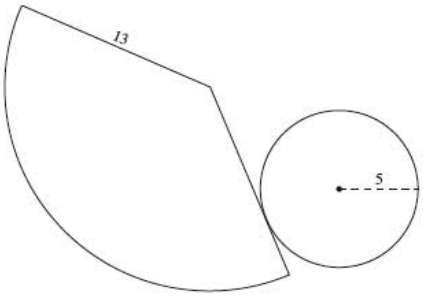
A.



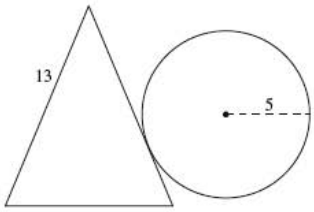
B.



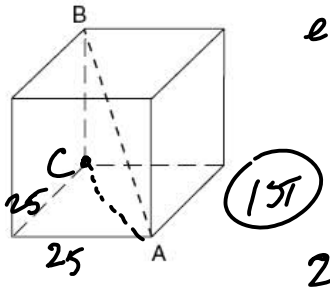
C.



D.



57. Polar Company has designed an ice block in the shape of a cube. The volume of the cube is 15 625 cm^3. Which of the following dimensions is the smallest opening of an ice dispenser that will accommodate length AB?



edge of cube = $\sqrt[3]{15625}$

edge = 25

1st

$25^2+25^2 = CA^2$

$625+625 = CA^2$

$1250 = CA^2$

$35.3553 = CA$

2nd

$AB^2 = 35^2+25^2$

$AB^2 = 1250+625$

$AB^2 = 1875$

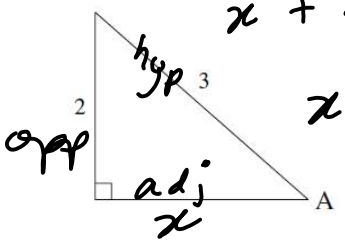
$AB = 43.3013$

A. 25 cm wide
B. 40 cm wide
C. 45 cm wide
D. over 50 cm wide

Section 4: Trigonometry

58. Determine the ratio of cos A.

NC



$x^2 + 2^2 = 3^2$

$x^2 = 3^2 - 2^2$

$x^2 = 9 - 4$

$x^2 = 5$

$x = \sqrt{5}$

$\cos A = \frac{adj}{hyp} = \frac{\sqrt{5}}{3}$

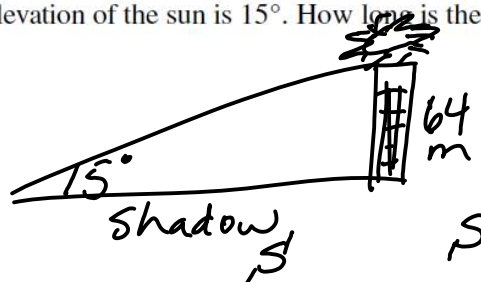
A. $\cos A = \frac{2}{3}$

B. $\cos A = \frac{\sqrt{5}}{3}$

C. $\cos A = \frac{\sqrt{13}}{3}$

D. $\cos A = \frac{3}{\sqrt{5}}$

59. The angle of elevation of the sun is 15°. How long is the shadow of a 64 m tall building?



$\tan 15 = \frac{64}{s}$

$s = \frac{64}{\tan 15}$ so, $s = 238.85$

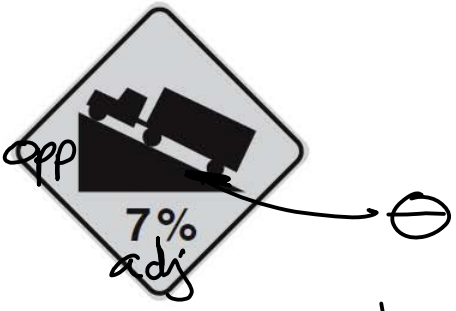
A. 17 m

B. 66 m

C. 239 m

D. 247 m

60. As Tracey is driving, she sees a sign telling her the road has a 7% grade (i.e., a rise of 7 metres for a horizontal change of 100 m). Which of the following expressions will calculate the angle between the road and the horizontal?



7 opp

θ

adj 100

$\tan\theta = \frac{7}{100}$

so $\theta = \tan^{-1}\left(\frac{7}{100}\right)$

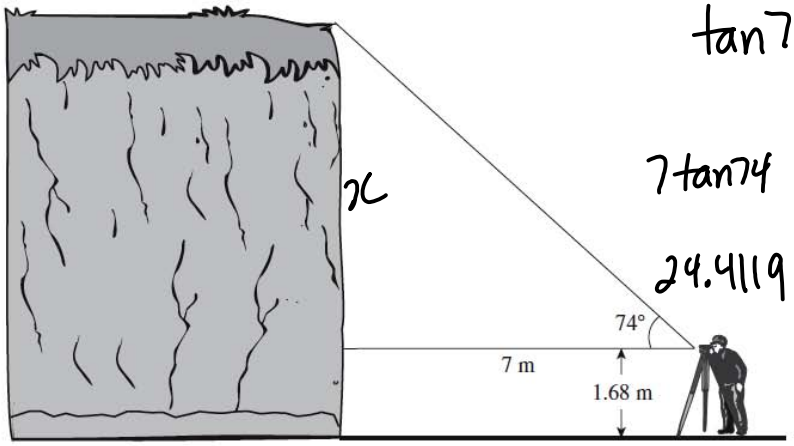
A. $\tan\left(\frac{7}{100}\right)$

B. $\sin\left(\frac{7}{100}\right)$

C. $\tan^{-1}\left(\frac{7}{100}\right)$

D. $\sin^{-1}\left(\frac{7}{100}\right)$

61. Mission's outdoor club collected the following data to determine the height of a cliff.



$\tan 74° = \frac{x}{7}$

$7\tan 74 = x$

$24.4119 = x$

plus 1.68 m

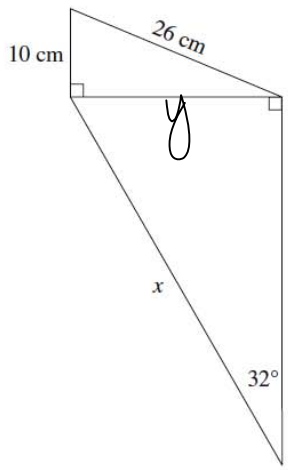
$24.4119 + 1.68$

cliff = 26.0919

Calculate the height of the cliff.

A. 3.7 m
B. 8.4 m
C. 24.4 m
D. 26.1 m

62. Calculate the length of side x on the diagram below. Answer to the nearest centimetre.



1st $26^2 = 10^2 + y^2$

$26^2 - 10^2 = y^2$

$676 - 100 = y^2$

$576 = y^2$

$24 = y$

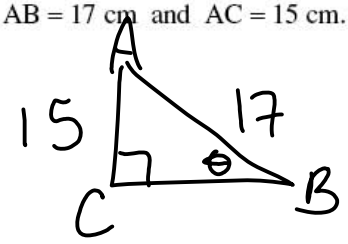
2nd $\frac{\sin 32°}{1} = \frac{24}{x}$

$\frac{24}{\sin 32°} = x$

$45.29 = x$

63. In ΔABC, $\angle C = 90°$, AB = 17 cm and AC = 15 cm. Calculate the measure of $\angle ABC$.

A. 28°
B. 41°
C. 49°
D. 62°

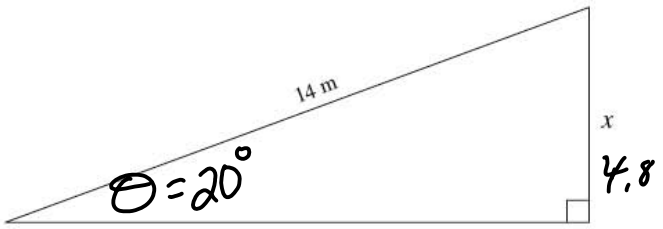


$\sin\theta = \frac{15}{17}$ 2nd F

$\theta = \sin^{-1}\left(\frac{15}{17}\right)$

$\theta = 62°$

64. Using a protractor, measure one of the unknown angles and determine the length of side x.



Note: This diagram is drawn to scale.

*note - since it's to scale, you could measure & use proportions to solve.

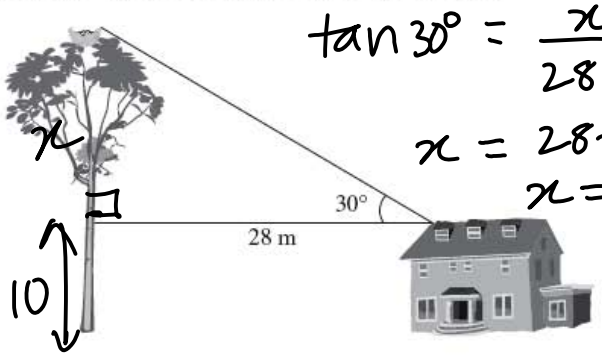
A. 3.5 m
B. 4.8 m
C. 5.1 m
D. 13.2 m

$\theta = 20°$ by protractor

$\sin 20 = \frac{x}{14}$

$14 \sin 20° = x = 4.8$

65. A 10 metre tall farmhouse is located 28.0 m away from a tree with an eagle's nest. The angle of elevation from the roof of the farmhouse to the eagle's nest is 30°.



$\tan 30° = \frac{x}{28}$

$x = 28 \tan 30°$

$x = 16.1658$

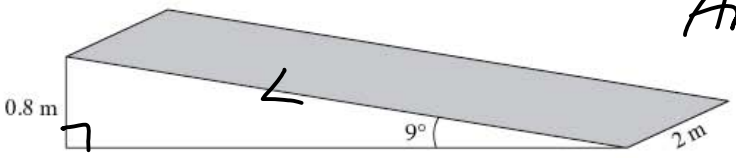
add 10

26.16

What is the height of the eagle's nest?

A. 16 m
B. 24 m
C. 26 m
D. 48 m

66. A ramp is set up using a rectangular piece of plywood (shaded region) as shown below.



$Area_{plywood} = L \cdot W$

$= L \cdot 2$

Calculate the area of the plywood. Answer in square metres to one decimal place.

$\frac{\sin 9°}{1} = \frac{0.8}{L}$

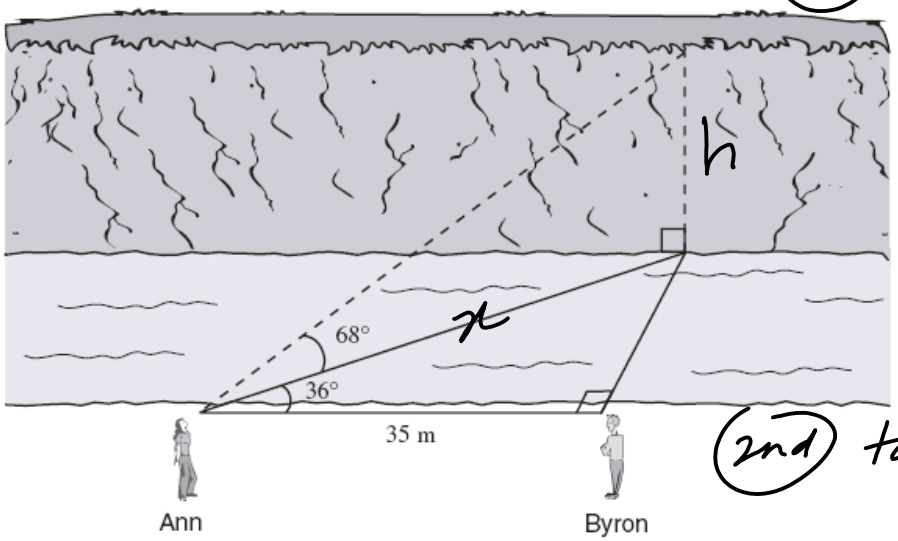
$L = \frac{.8}{\sin 9}$

$L = 5.1140$

$Area = 5.1140 \times 2$

$= 10.2$

67. Ann and Byron positioned themselves 35 m apart on one side of a stream. Ann measured the angles, as shown below.



Calculate the height of the cliff on the other side of the stream.

A. 17.5 m
B. 62.9 m
C. 70.1 m
D. 107.1 m

1ST $\cos 36 = \frac{35}{x}$

$x = \frac{35}{\cos 36}$

$x = 43.2624$

2nd $\tan 68° = \frac{h}{43.2624}$

$h = 43.2624 \tan 68$

$h = 107.0871$

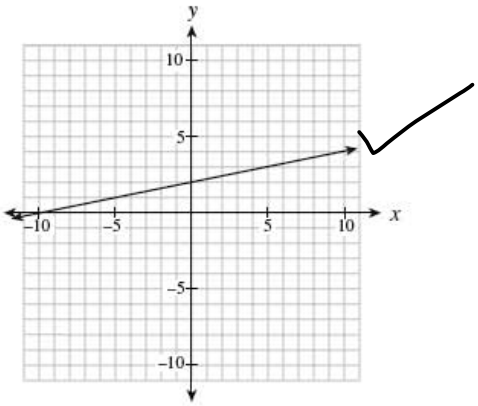
Section 5: Linear Equations and Graphs

$x+10=5y$

68. Which graph represents the relation $x-5y+10=0$?

NC

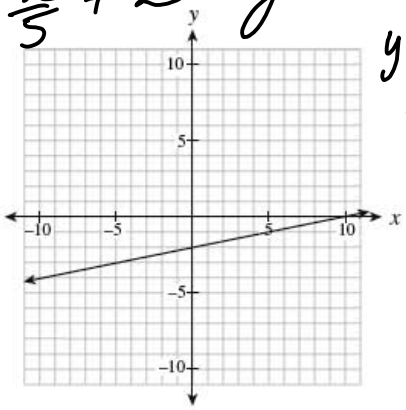
A.



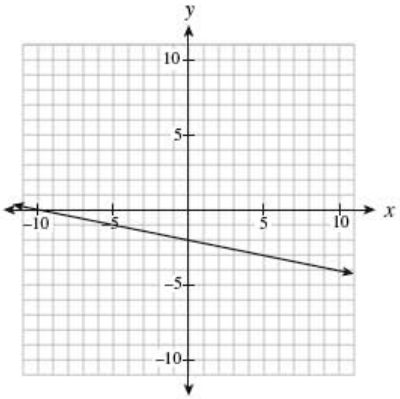
B. $\frac{x}{5}+2=y$

y int (0,2)

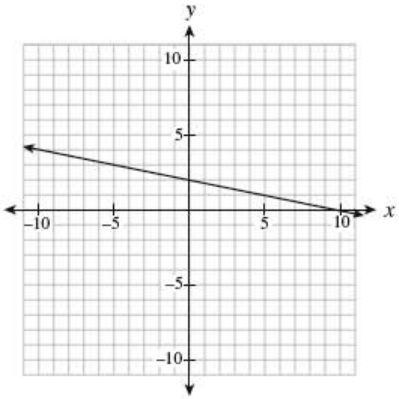
$m=\frac{1}{5}$



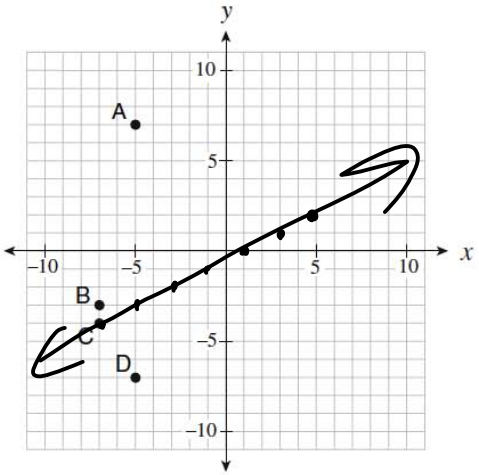
C.



D.



Use the following graph to answer question 69



69. The line $y-2=\frac{1}{2}(x-5)$ passes through which point on the graph?

NC

thru (5,2) $m=\frac{1}{2}$

A. A
B. B
C. C
D. D

70. Determine the slope of the linear relation $3x+5y+15=0$.

A. $\frac{5}{3}$
B. $\frac{3}{5}$
C. $-\frac{3}{5}$
D. $-\frac{5}{3}$

$5y=-3x-15$

$y=-\frac{3}{5}x-3$

$m=-\frac{3}{5}$

71. Determine the slope-intercept equation of the line that is parallel to $y=\frac{2}{5}x-3$ and passes through the point $(0,\ 5)$.

$m=\frac{2}{5}$ yint 5, so $y=\frac{2}{5}x+5$

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

72. Lines A and B are perpendicular and have the same x-intercept. The equation of line A is $x+2y-4=0$. Determine the y-intercept of line B.

A: $2y=-x+4$

$y=-\frac{x}{2}+2$

A: x int (let $y=0$)

$x+2(0)-4=0$

$x-4=0$

$x=4$

negative of $-\frac{1}{2}$ reciprocal

Line B $m=2$ and thru (4,0).

so $y=2x+b$, find b by subbing in (4,0)

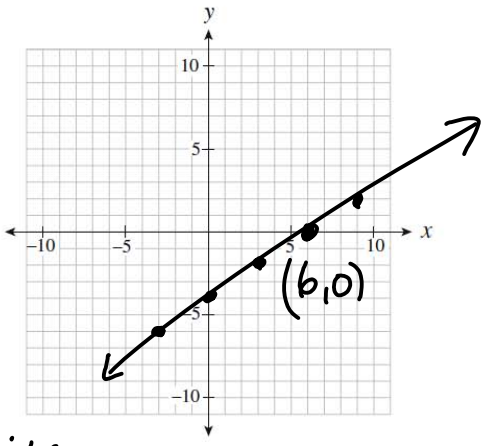
$0=2(4)+b$

$0=8+b$

$-8=b$

A. –8
B. –2
C. 4
D. 8

The grid below may be used for rough work to answer question 73



rise

73. A line has a slope of $\frac{2}{3}$ and passes through the point $(6, 0)$. Which of the following points must also be on the line? run

A. $(-3, -6)$
B. $(3, 8)$
C. $(4, -3)$
D. $(9, 3)$

74. Rewrite $y = \frac{x}{5} - 6$ in general form. mult by 5 $5y = x - 30$

$0 = x - 5y - 30$

A. $\frac{x}{5} - y - 6 = 0$
B. $x + 5y - 6 = 0$
C. $x - 5y - 30 = 0$
D. $5x - 5y - 30 = 0$

75. Given the equation $Ax + By + C = 0$, which of the following conditions must be true for the graph of the line to have a positive slope and a positive y-intercept? if $A > 0$, $C > 0$

$By = -Ax - C$

$y = -\frac{A}{B}x - \frac{C}{B}$

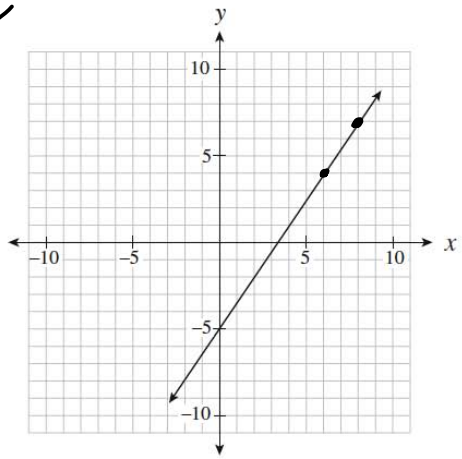
A. $A > 0,\ B > 0,\ C > 0$
B. $A > 0,\ B < 0,\ C > 0$
C. $A > 0,\ B > 0,\ C < 0$
D. $A > 0,\ B < 0,\ C < 0$

If $A > 0$, $C > 0$, then for $-\frac{A}{B}$ and $\frac{C}{B}$ to be pos, B is neg.

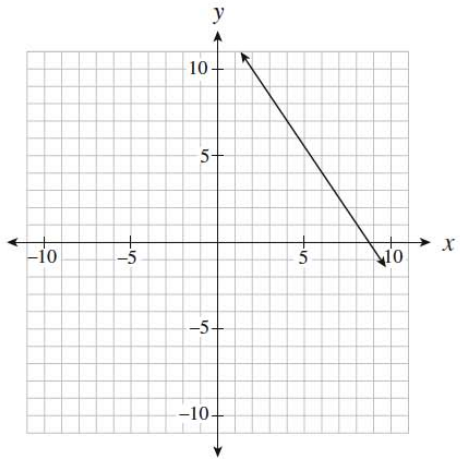
76. Which of the following graphs represents a line that passes through $(6, 4)$ and is perpendicular to $y = -\frac{2}{3}x$?

slope $\frac{3}{2}$

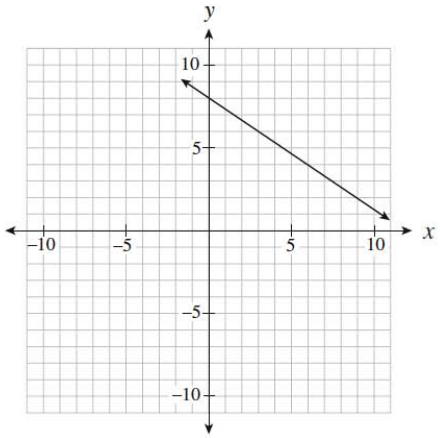
A)



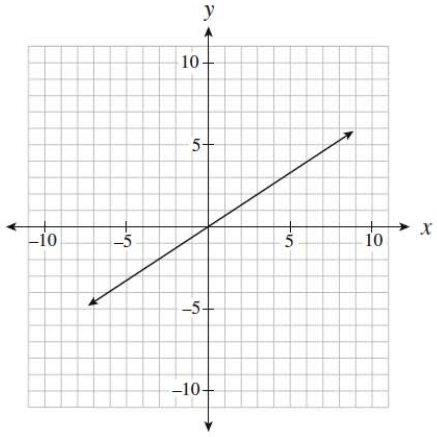
B.



C.



D.



77. Determine the slope-intercept form of the line that passes through the point $(-4, 3)$ and is parallel to the line segment that joins $A(-1, -5)$ and $B(-3, 1)$.

A) $y = -3x - 9$
B. $y = -3x + 5$
C. $y = -3x + 15$
D. $y = 3x + 15$

$m = \frac{1 - -5}{-3 - -1} = \frac{6}{-2} = -3$

parallel slope -3, then $(-4,3)$ subin

sub in $(-4,3)$ to get b ➡ $y = -3x + b$

$3 = -3(-4) + b$

$3 = 12 + b$

$-9 = b$

so $y = -3x - 9$

78. Which of the following statements are true for $2x + 3y = 6$?

I.	The y-intercept is -2.
II.	The line is parallel to $y = 2x$.
III.	The slope-intercept form of the line is $y = \frac{2}{3}x + 2$.
IV.	The range is all real numbers.

A. IV only
B. I and II only
C. I and IV only
D. III and IV only

$3y = -2x + 6$

$y = -\frac{2}{3}x + 2$

$y$int $(0, 2)$

$m = -\frac{2}{3}$

79. A hot-dog stand owner makes a profit of \$100 when he sells 90 hot dogs a day. He has a loss of \$30 when he sells 25 hot dogs a day. Which linear relation represents his profit?

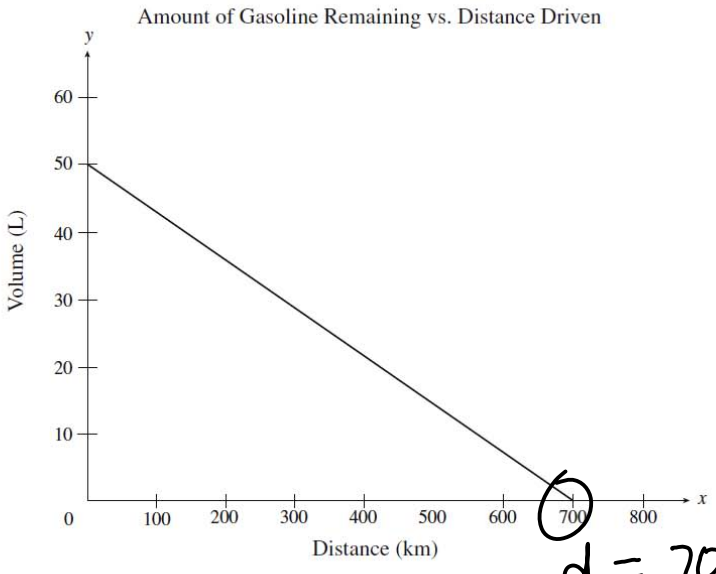
A. $y = 0.5x + 55$
B. $y = 1.08x + 3.08$
C. $y = 1.11x$
D. $y = 2x - 80$

$(90, 100)$
$(25, -30)$

$m = \frac{100 - -30}{90 - 25}$

$m = \frac{130}{65} = 2$

Use the following graph to answer question 80.



$d = 700$ Litres $= 0$

80. The graph above shows the relationship between the amount of gasoline remaining in a 50 L tank and the distance driven for a certain car.

What does the x-intercept represent in this situation?

A. fuel capacity of the gasoline tank
B. total distance travelled during a long trip
C. total distance driven until the car is out of gas
D. number of kilometres driven per litre of gasoline

81. The slope of AB is $-\frac{2}{3}$. The slope of CD is $\frac{w}{24}$. Given AB $\parallel$ CD, determine the value of w.
Answer as an integer.

equal slopes

$-\frac{2}{3} = \frac{w}{24}$ $\quad w = \frac{-2 \times 24}{3} = -16$

82. Determine the equation of a line, in slope-intercept form, that passes through the points $(6, 1)$ and $(-10, 9)$.

NC

A. $y = -\frac{1}{2}x + 4$

B. $y = -\frac{1}{2}x - 2$

C. $y = -2x + 8$

D. $y = -2x + 13$

$m = \frac{9-1}{-10-6} = \frac{8}{-16} = -\frac{1}{2}$

$y = -\frac{1}{2}x + b$ sub in $(6,1)$ to get b

$1 = -\frac{1}{2}(6) + b$

$1 = -3 + b$ $\quad b = 4$

83. Which of the following lines have a negative slope?

I.	$y + 3 = 0$
II.	$2x + y = 6$
III.	$(y + 2) = -4(x - 5)$

$y = -3$ horizontal line, 0 slope

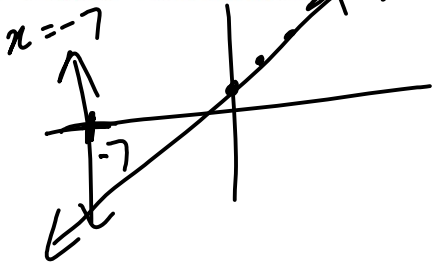
$y = -2x + 6$ $\quad m = -6$

$m = -4$

A. II only
B. III only
C. I and III only
D. II and III only

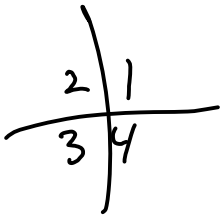
84. In which quadrant do the graphs of $x = -7$ and $y = 2x + 1$ intersect?

$y = 2x + 1$



A. Quadrant I
B. Quadrant II
C. Quadrant III
D. Quadrant IV

Quadrants



85. Which of the following coordinates are intercepts of the linear relation $2x - 3y + 30 = 0$?

I.	$(0, 10)$
II.	$\left(0, \frac{2}{3}\right)$
III.	$(-10, 0)$
IV.	$(-15, 0)$

Find x_{int} by subbing $y=0$

$2x - 3(0) + 30 = 0$

$2x + 30 = 0$

$2x = -30$

$x = -15$ $(-15, 0)$

y_{int} sub $x = 0$

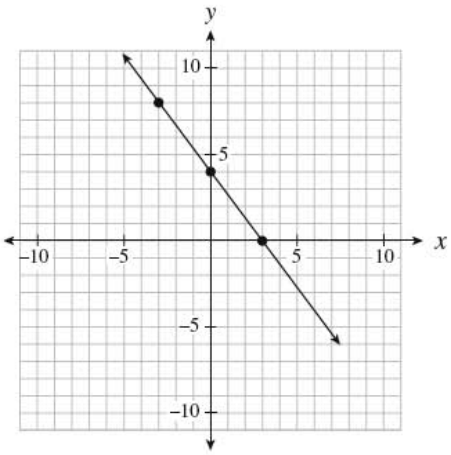
$2(0) - 3y + 30 = 0$

$-3y = -30$

$y = 10$ $(0, 10)$

A. I only
B. I and IV only
C. II and III only
D. II and IV only

Use the following graph to answer question 86



$y_{int} = (0, 4)$

$m = -\frac{4}{3}$

86. Which of the following equations describes the linear relation graphed above?

NC

I.	$y = \frac{4}{3}x + 4$ ✗ $m = \frac{4}{3}$
II.	$y - 8 = -\frac{4}{3}(x + 3)$ $m = -4/3$ thru $(-3, 8)$ ✓✓
III.	$4x + 3y - 12 = 0$

$3y = -4x + 12$

$y = -\frac{4}{3}x + 4$ ✓✓

A. II only
B. I and II only
C. I and III only
D. II and III only

87. Kelly explained her method for graphing the linear relation $y = -\frac{2}{3}x + 7$ as follows:

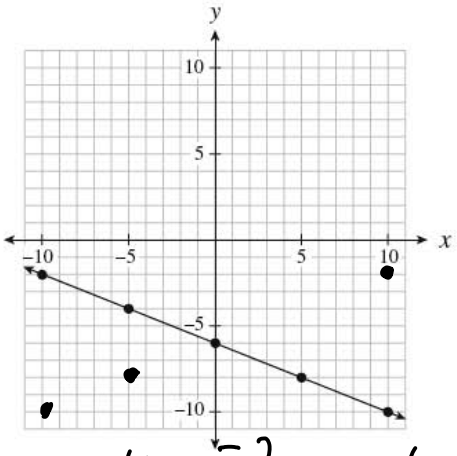
Steps	
I.	Place a dot on the y-axis at positive 7.
II.	Move up two on the y-axis to positive 9.
III.	From the positive 9, move to the left three spots and place a dot there.
IV.	Draw a line through the two dots.

also down 2, right 3 } works, too

Where did Kelly make the first mistake in her explanation?

A. Step I
B. Step II
C. Step III
D. There is no mistake.

88. Which of the following relations could be produced by $y = \frac{2}{5}x - 6$?

I.	$2x - 5y - 30 = 0$
II.	$\{(15, 0), (10, -2), (-5, -8), (-10, -10)\}$
III.	

$2x - 30 = 5y$ $y = \frac{2}{5}x - 6$

sub in pts, or graph to check

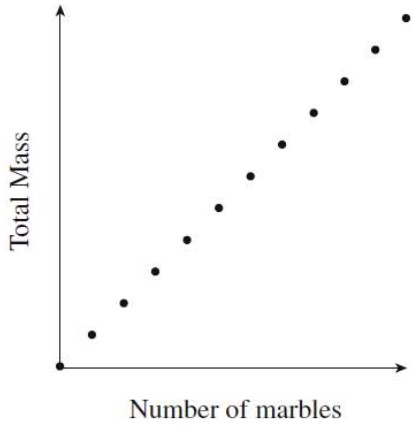
$y = -\frac{2}{5}x - 6$

A. I only
B. II only
C. I and II only
D. I, II and III

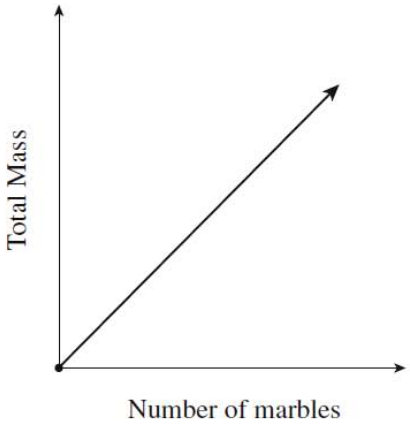
Section 6: Relations and Functions

89. Marbles are placed in a jar one at a time. Which graph below best represents the total mass of the jar and marbles as the marbles are added?

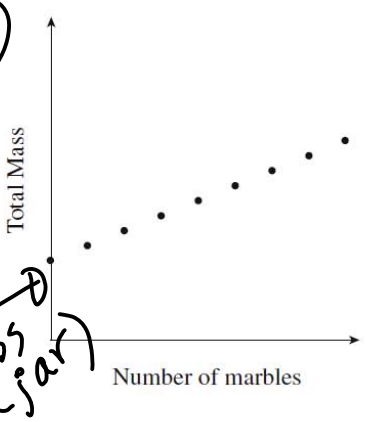
A.



B.

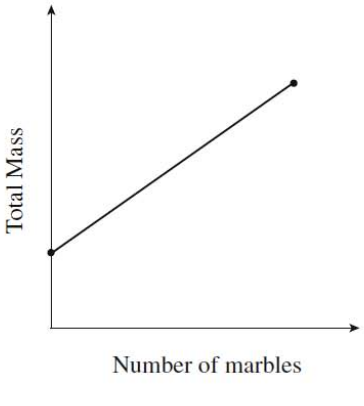


C.

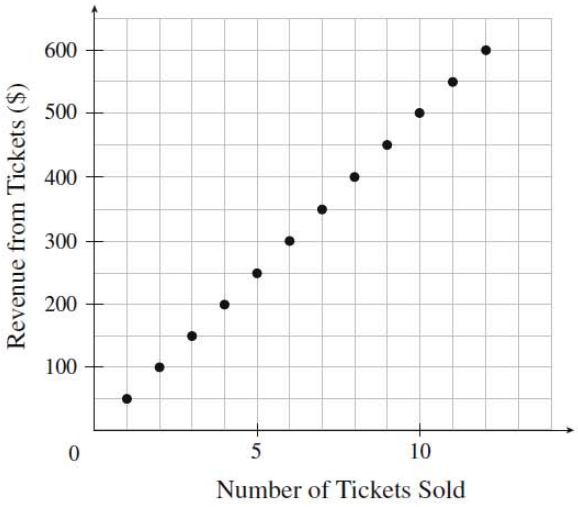


Some → mass (jar)

D.



90. What does the slope represent in the graph below?



$m = \frac{\text{change in Rev}}{\text{change in \# tickets}}$

= price per ticket

A. price per ticket
B. profit from tickets
C. revenue from tickets
D. number of tickets sold

91. The cost C, in dollars, to rent a car is determined by the formula $C(k) = 0.15k + 22$, where k is the number of kilometres driven. Calculate the value of k if $C(k) = 166$. Answer to the nearest kilometre.

$C(k) = .15k + 22$

$166 = .15k + 22$

$144 = .15k$

$\frac{144}{.15} = k$

$k = 960$

92. Damien has a list of 37 potential customers for his house-painting business. In order to get a business grant, he must graph his income versus the number of customers. Determine the domain of the graph.

A. $\{0, 1, 2, 3, \ldots\}$

B. $\{0, 1, 2, 3, \ldots 37\}$

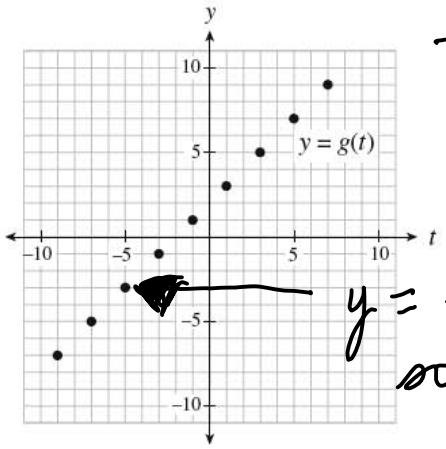
C. all real numbers

D. all real numbers between 0 and 37

93. A waterslide descends 20 m over a horizontal distance of 50 m. What is the slope of the waterslide? Answer, with a positive value, to the nearest tenth.

$\frac{\text{rise}}{\text{run}} = \frac{20}{50} = \frac{2}{5} = 0.4$

94. Given the graph of $y = g(t)$ below, determine the value of t for which $g(t) = -3$. Answer as an integer.



t is like x, so find t for a "y" value of -3

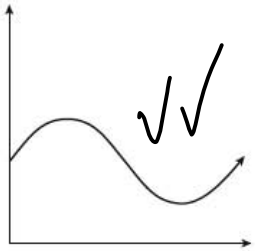
$y = -3$

so $t = -5$

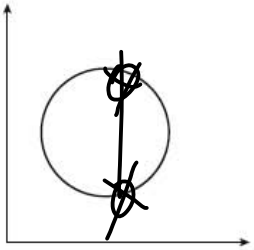
95. Which of the following relations are also functions?

passes vertical line test

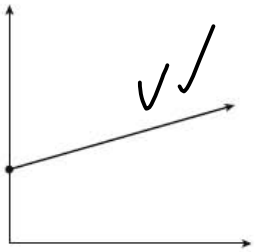
I.



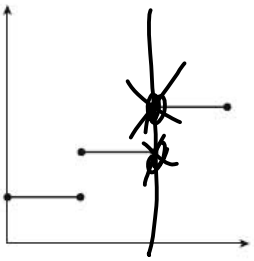
II.



III.



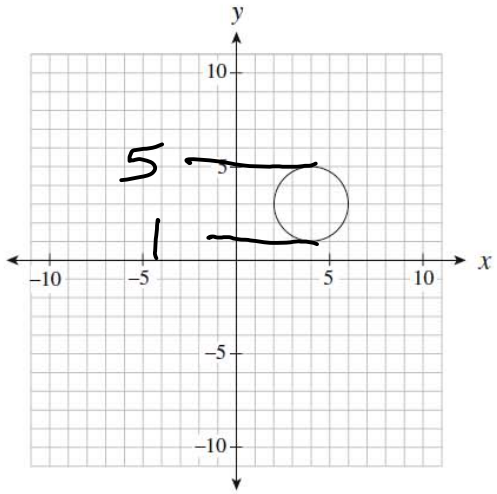
IV.



A. III only
B. I and III only
C. II and IV only
D. I, III and IV only

96. What is the range of the graph below?

all possible y values



includes]

(does not include

I.	All x values between 2 and 6 inclusive.
II.	$(2, 6)$
III.	$[1, 5]$
IV.	$1 \le y \le 5$

A. III only
B. IV only
C. I and II only
D. III and IV only

97. Which ordered pair represents $f(3) = -5$?

A. $(-5, 3)$
B. $(-3, 5)$
C. $(3, -5)$
D. $(5, -3)$

x
y
f(x) = y
function notation

98. The cost C, in dollars, of renting a hall for the prom is given by the formula $C(n) = 500 + 4n$, where n is the number of students attending the prom. Calculate the cost of renting the hall if 70 students attend.

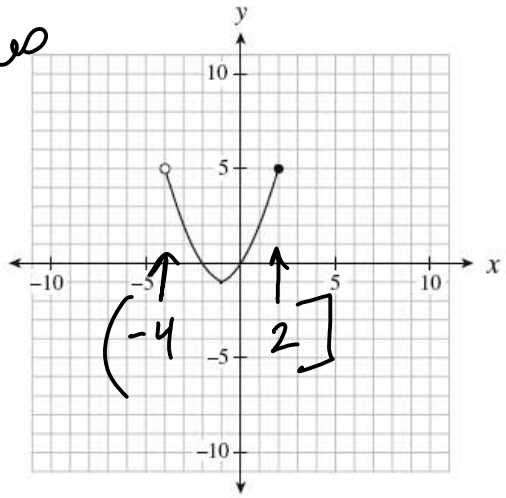
NC

A. \$108
B. \$500
C. \$780
D. \$970

$C(70) = 500 + 4(70)$
$= 500 + 280$
$= 780$

99. Determine the domain of the relation graphed below.

all possible x values

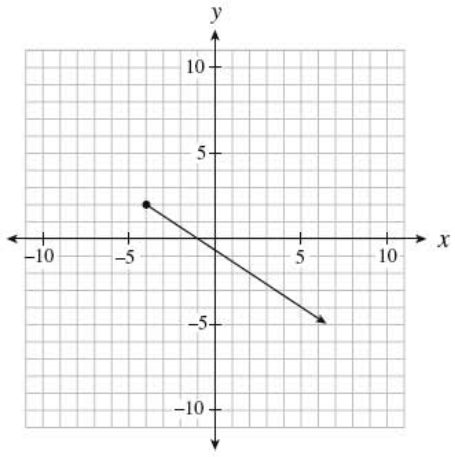


A. $(-4, 2]$
B. $[-4, 2)$
C. $[-1, 5)$
D. $[-1, 5]$

100. Which of the following scenarios is **not** linear?

A. the height of a football thrown over time
B. the total weight of a jar of pennies as more pennies are added
C. the distance travelled by a car moving at a constant speed over time
D. the pay of a truck driver who earns \$2500 a month, plus \$0.50 for every kilometre he drives

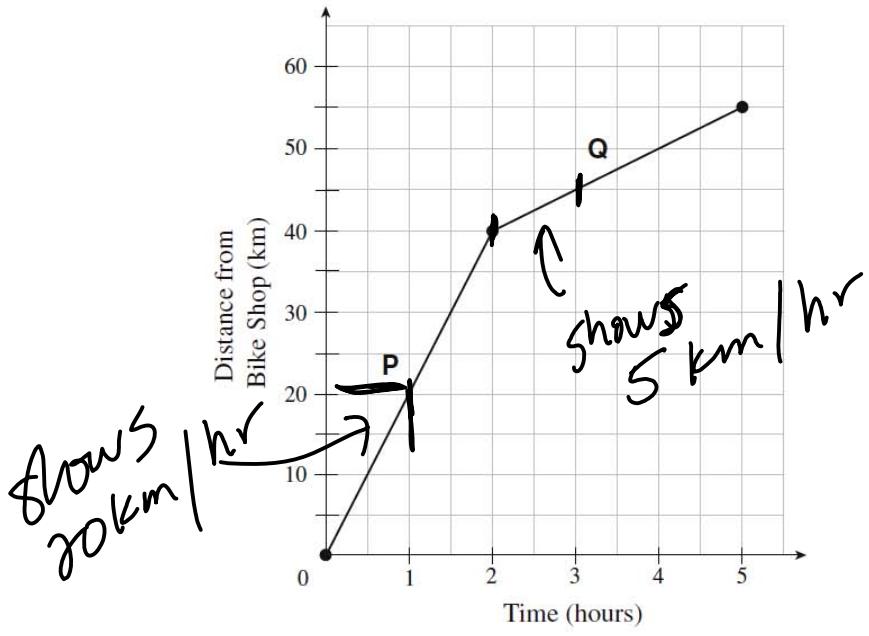
101. Determine the range of the linear relation graphed below.



A. $y \le -4$
B. $y \le 2$
C. $y \ge -4$
D. $y \ge 2$

102. The graph below models a bicycle's distance from a bike shop over time.

NC

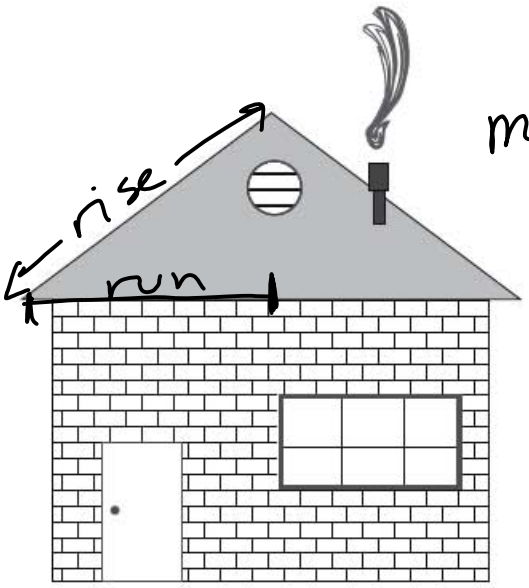


so, decrease by 15km/hr

Calculate the change in the speed of the bike from segment P to segment Q.

A. decreased by 15 km/h
B. decreased by 5 km/h
C. increased by 15 km/h
D. increased by 11 km/h

103. Use a ruler to determine the slope of the roof shown below.



measure $\frac{\text{rise}}{\text{run}}$, reduce

Note: This diagram is drawn to scale.

A. $\frac{3}{8}$

B. $\frac{3}{4}$

C. $\frac{4}{5}$

D. $\frac{4}{3}$

$x_1\ y_1 \quad x_2 y_2$

104. Calculate the slope between the points $(7, -3)$ and $(4, 3)$.

A. -2

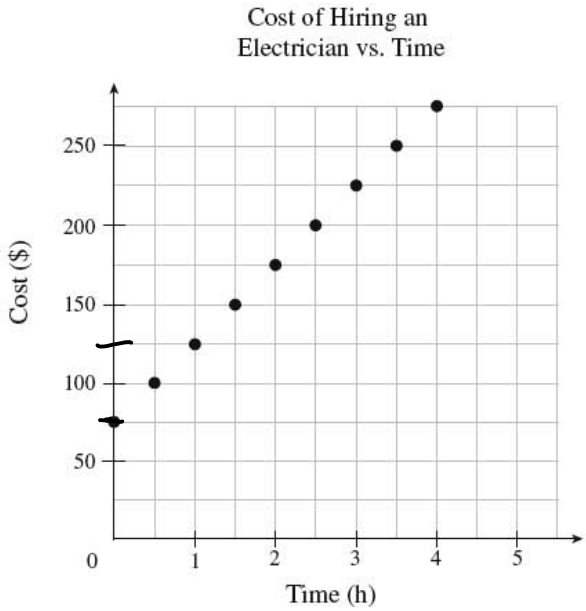
B. $-\frac{1}{2}$

C. 2

D. 10

$\frac{y_2-y_1}{x_2-x_1} = m = \frac{3-(-3)}{4-7} = \frac{6}{-3} = -2$

Use the graph below to answer question 105



$C = mx + 75$

$m = \frac{50}{1}$ $\frac{\text{rise}}{\text{run}}$

$C = 50x + 75$

↓ cost ↑ # hrs

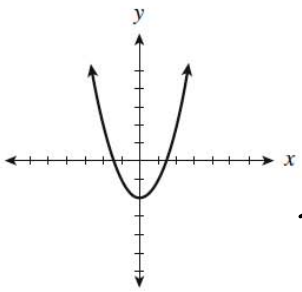
105. What is the cost of hiring an electrician for 8 hours?

A. $550
B. $475
C. $400
D. $275

$C = 50(8) + 75$
$= 400 + 75$
$= 475$

106. Which of the following relations are also functions?

two x's, not fcn

I.	$\{(0, 2), (1, 4), (3, 6), (4, 5), (4, 3), (7, -8)\}$
II.	$y = 2x + 5$ ✓ linear fcn
III.	The output is 6 more than half the input. ✓ linear fcn.
IV.	 yes, passes vertical line test fcn

A. I only
B. I and IV only
C. II and III only
D. II, III and IV only

107. A line with an undefined slope passes through the points $(-2, 1)$ and (p, q). Which of the following points could be (p, q)?

A. $(1, 0)$
B. $(0, 1)$
C. $(0, -2)$
D. $(-2, 0)$

undefined slope, $\frac{\text{rise}}{\text{run}}$ has 0 for run

so $\frac{y_2 - y_1}{x_2 - x_1} = 0$

so $p = -2$

also, graph $(-2, 1)$ vertical line

108. Alex bought 144 bagels for $80. His profit was $75 once he had sold 100 bagels. Which equation below represents Alex's profit P, as a function of the number sold, n?

A. $P = -0.05n + 80$
B. $P = 0.05n - 80$
C. $P = 0.75n$
D. $P = 1.55n - 80$

(0, -80)
(100, 75)

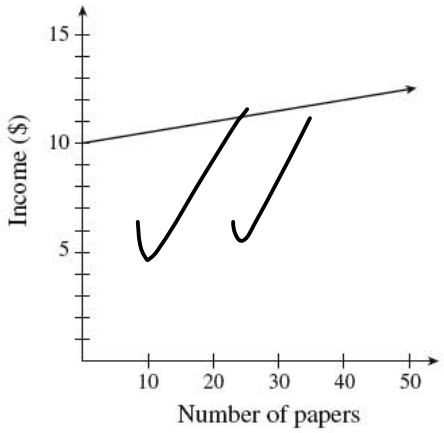
$m = \frac{-80 - 75}{0 - 100}$

$= \frac{-155}{-100}$

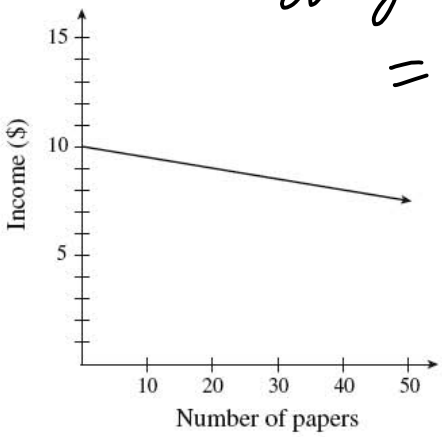
109. Jim delivers newspapers. He gets paid 10 dollars for every day of work, plus 5 cents for every paper he delivers. Which of the following graphs best represents Jim's possible income for one day?

every 10 papers = 50¢ more

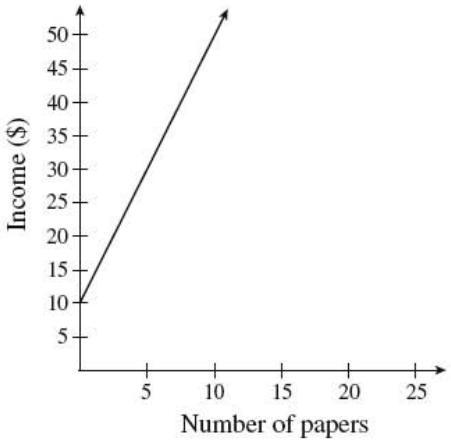
A.



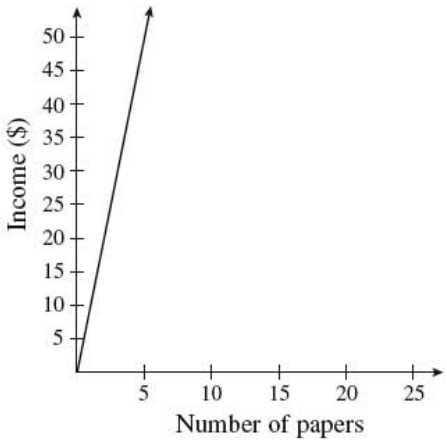
B.



C.



D.



(1000, 32) and (3500, 44.50)

110. The cost to insure jewellery is a fixed amount plus a percentage of the value of the jewellery. It costs $32 to insure $1000 worth of jewellery or $44.50 to insure $3500 worth of jewellery. What is the fixed amount to insure jewellery?

A. $27.00
B. $31.25
C. $44.65
D. $58.82

$m = \frac{44.5 - 32}{3500 - 1000}$

$m = .005$

if $C = 90V + f$
or $C = mV + f$

$C = .005V + f$
sub in (1000, 32)

$32 = .005(1000) + f$
$32 = 5 + f$
$27 = f$

Section 7: Solving Systems of Linear Equations

h = weight of hex bolt a = weight anchor bolt

111. A package of 12 hex bolts and 10 anchor bolts weighs 7 pounds. A second package of 5 hex bolts and 15 anchor bolts weighs 4 pounds. How much does a single hex bolt weigh? Answer in pounds to one decimal place.

(A) $12h + 10a = 7$ mult by 5 → $60h + 50a = 35$

(B) $5h + 15a = 4$ mult by 12 → $60h + 180a = 48$ subtract

$-130a = -13$

$a = \frac{1}{10}$

sub in $5h + 15(\frac{1}{10}) = 4$

$5h + \frac{15}{10} = 4$

$5h = 2.5$

$h = 0.5$

112. Solve for y in the following system of equations:

NC

(A) $x - y = -1$

(B) $3x + 5y = 21$

A. 2
B. 3
C. 9
D. 12

(A) × 3 → $3x - 3y = -3$ subtract

$8y = 24$

$y = 3$

113. Which of the following systems of linear equations has a solution of $(-3, 4)$?

sub in to test

A. $\begin{cases} 2x - 3y = 6 \\ y = 3x - 13 \end{cases}$

B. $\begin{cases} 2x - 3y = 6 \\ y = 3x + 13 \end{cases}$

C. $\begin{cases} 2x + 3y = 6 \\ y = 3x - 13 \end{cases}$

$2(-3) + 3(4) \stackrel{?}{=} 6$ ✓✓

$4 = 3(-3) + 13$ no

D. $\begin{cases} 2x + 3y = 6 \\ y = 3x + 13 \end{cases}$ ✓✓ yes

$4 \stackrel{?}{=} 3(-3) + 13$ yes ✓✓

114. Two planes have a cruising speed of 570 km/h without wind. The first plane flies for 12 hours against a constant headwind. The second plane flies for 10 hours in the opposite direction with the same wind (a tailwind). The second plane flies 370 km less than the first plane.

Determine two equations that could be used to solve for the wind speed, w, and the distance travelled by the first plane, d.

A. $(570 - w)(12) = d$
$(570 + w)(10) = d - 370$

B. $(570 - w)(12) = d$
$(570 + w)(10) = d + 370$

C. $(570 + w)(12) = d$
$(570 - w)(10) = d - 370$

D. $(570 + w)(12) = d$
$(570 - w)(10) = d + 370$

115. How many solutions does this system of equations have?

NC

$y = 3x + 7$
$y = 3x - 4$

same slope, diff y intercepts

A. no solution
B. one solution
C. an infinite number of solutions
D. cannot be determined without solving

116. Solve for x:

$3x + 4y = -16$
$x = 4y$

$3(4y) + 4y = -16$
$12y + 4y = -16$
$16y = -16$
$y = -1$, sub in $x = 4y$
$x = 4(-1)$
$x = -4$

117. How many solutions does this system of equations have?

$y = 3x + 7$
$y = 3x - 4$

same as 115

A. no solution
B. one solution
C. an infinite number of solutions
D. cannot be determined without solving

118. Solve the following system of equations:

NC

(A) $4x+2y=8$

(B) $-3x+y=-1$

multiply by 2

$4x+2y=8$

$-6x+2y=-2$ subtract

$10x = 10$

$x=1$

sub in $-3(1)+y=-1$

$y=+2$

A. $(-3, 10)$

B. $(-1, 6)$

C. $(1, 2)$

D. $(3, 2)$

119. Kim invested a total of $1500 between two bonds. One bond earned 8% per annum and the other bond earned 10% per annum. In one year, Kim earned $132 on her investments. How much did she invest in the bond that earned 10%?

amt at 8% = x

amt at 10% = y

(A) $x+y=1500$

(B) $.08x+.10y=132$

isolate x: $x=1500-y$ sub in (B)

$.08(1500-y)+.10y=132$

$120-.08y+.10y=132$

$120+.2y=132$

$.2y=12$

$y=600$

A. $600

B. $750

C. $900

D. $1000

120. Joey bought 8 books. Some books cost $12 each the rest cost $18 each. He spent a total of $108. Which of the following systems of linear equations could represent the given situation?

A. $x+y=8$ ✓
$12x+18y=108$ ✓

B. $x+y=108$
$12x+18y=8$

C. $x+12y=8$
$x+18y=108$

D. $12x+y=8$
$x+18y=108$