

**PART A: MULTIPLE-CHOICE QUESTIONS**  
(calculator not permitted)

Value: 12 marks

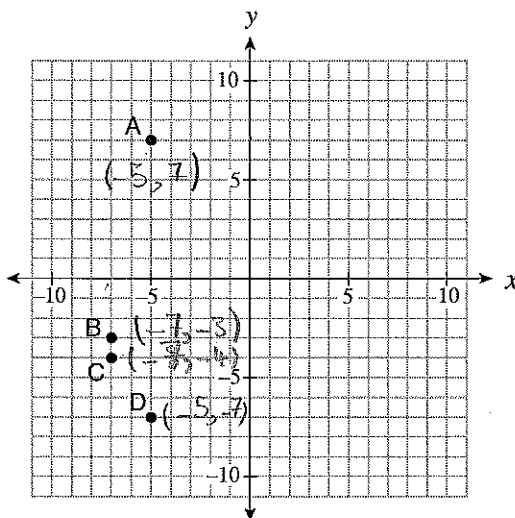
Suggested Time: 30 minutes  
Allowable Time: 40 minutes

**INSTRUCTIONS:** No calculator may be used for this part of the examination. For each question, select the best answer and record your choice on the blue Answer Sheet provided. Using an HB pencil, completely fill in the bubble that has the letter corresponding to your answer. You have a maximum of 40 minutes to work on this section.

You have Examination Booklet Form B. In the box above #1 on your Answer Sheet, fill in the bubble as follows.

Exam Booklet Form/ Cahier d'examen	A	B	C	D	E	F	G	H
	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Use the following graph to answer question 1.



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

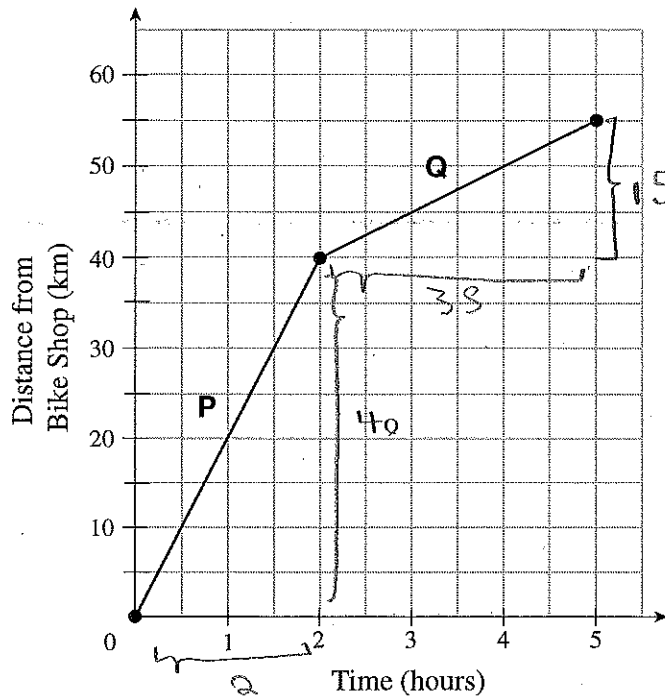
- A. A
- B. B
- C. C
- D. D

$$A \rightarrow \frac{5}{2} = \frac{1}{2}(-5 - 5) \rightarrow 5 \neq -5 \times$$

$$B \rightarrow -3 - 2 = \frac{1}{2}(-7 - 5) \rightarrow -5 \neq -6$$

$$C \rightarrow -4 - 2 = \frac{1}{2}(-7 - 5) \rightarrow -6 = -6 \rightarrow \checkmark$$

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



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

- A. decreased by 15 km/h  $\text{slope} = v_p = \frac{y}{x} = \frac{40}{2} = 20$   
 B. decreased by 5 km/h  
 C. increased by 15 km/h  $\text{slope} = v_q = \frac{y}{x} = \frac{15}{3} = 5$   
 D. increased by 11 km/h

$\Delta \text{slope} = 5 - 20 = -15 \rightarrow \text{decreased}$

3. Solve the following system of equations:

$$\begin{aligned} 4x + 2y &= 8 & 4x + 2y &= 8 \\ -3x + y &= -1 & -6x + 2y &= -2 \end{aligned}$$

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

$$\begin{aligned} & +10x = 10 \rightarrow \\ & \boxed{x = 1} \\ -3(1) + y &= -1 \rightarrow (1, 2) \\ -3 + y &= -1 \rightarrow \\ y &= -1 + 3 \\ y &= 2 \end{aligned}$$

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

$$y = 3x + 7$$

$$y = 3x - 4$$

Slope  $\rightarrow$  the same

$$\frac{a}{a'} \neq \frac{b}{b'} \rightarrow \text{no solution}$$

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

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

A.  $2 \times 3$

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

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

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

$$18 \times 24 = 2 \times 3^2 \times 3 \times 2^3$$

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

A. 360

B. 12

C. 6

D. 2

$$3 \times 2^2, 3 \times 2^3, 3 \times 2 \times 5, 2 \times 3^2$$

$$3 \times 2 = 6$$

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

A.  $\sqrt{10}$

B.  $\sqrt{20}$

C.  $\sqrt{50}$

D.  $\sqrt{100}$

$$\sqrt{2^2 \times 5} = \sqrt{20}$$

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

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

$$-\sqrt{18}$$

$$\sqrt{9}$$

$$\sqrt{12}$$

$$-\sqrt{28}$$

$$-\sqrt{28} < -\sqrt{18} < \sqrt{9} < \sqrt{12} \rightarrow$$

$$IV < I < II < III$$

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

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

$$2^4 \cdot 3 \cdot x^{13}$$

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

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

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

$$1000 \text{ feet} \times \frac{1 \text{ mile}}{5280 \text{ feet}} \times \frac{1.609 \text{ km}}{1 \text{ mile}} = 0.304 \text{ km}$$

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

A.  $4 \text{ yd} \times \frac{2.54 \text{ cm}}{1 \text{ in}} \approx 10.16$

$4 \text{ yards} \times \frac{0.9144 \text{ m}}{1 \text{ yard}} \times \frac{100 \text{ cm}}{1 \text{ m}} = 365.76 \text{ cm}$

B.  $4 \text{ yd} \times \frac{3 \text{ ft}}{1 \text{ yd}} \times \frac{2.54 \text{ cm}}{1 \text{ ft}} \approx 30.48$

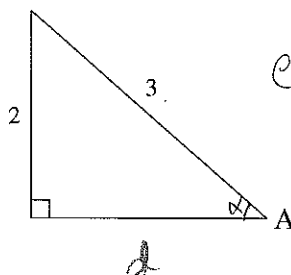
C.  $4 \text{ yd} \times \frac{3 \text{ ft}}{1 \text{ yd}} \times \frac{12 \text{ in}}{1 \text{ ft}} \times \frac{2.54 \text{ cm}}{1 \text{ in}} \approx 365.76$

D.  $4 \text{ yd} \times \frac{1 \text{ ft}}{3 \text{ yd}} \times \frac{1 \text{ in}}{12 \text{ ft}} \times \frac{1 \text{ cm}}{2.54 \text{ in}} \approx 0.43$

12. Determine the ratio of  $\cos A$ .

$3^2 = 2^2 + d^2 \rightarrow d = \sqrt{9-4} = \sqrt{5}$

$\cos A = \frac{d}{3} \rightarrow \cos A = \frac{\sqrt{5}}{3}$



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

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

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

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

**This is the end of Part A (calculator not permitted).**

If there is some time left, you have two options:

- i) Make sure you have answered all the questions. You will not be able to go back to this section at the end of 40 minutes.
- ii) You may proceed to the rest of the examination without the use of a calculator; there are many questions that do not require a calculator. Make sure you flag any questions you skip to remember to go back to them later.

Do not access your calculator until directed by the supervisor. At the end of the 40 minutes, the supervisor will give you permission to access your calculator.

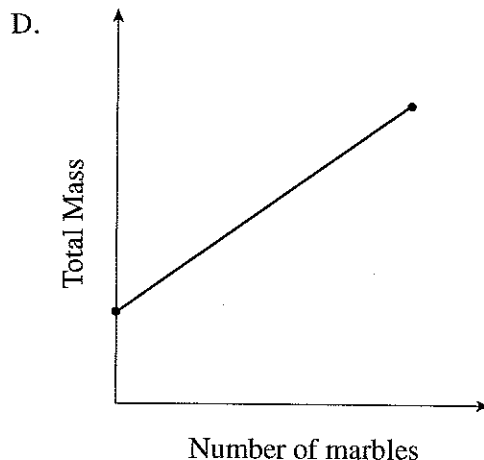
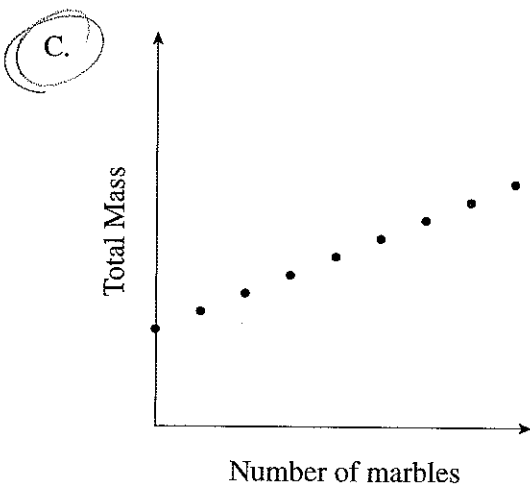
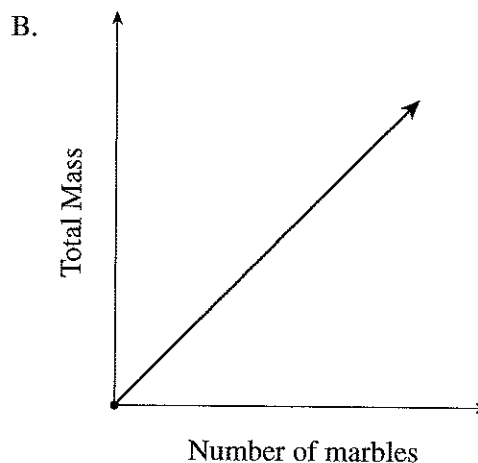
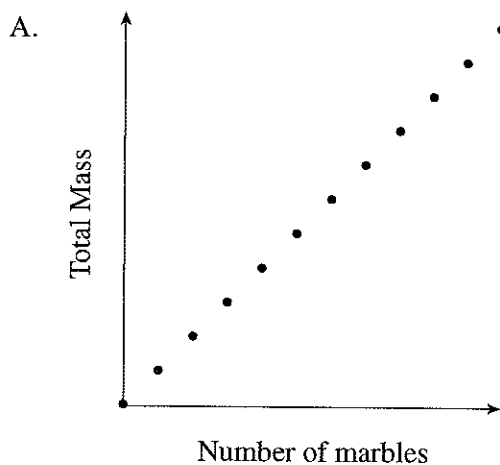
**PART B: MULTIPLE-CHOICE QUESTIONS**  
(calculator permitted)

Value: 42 marks

Suggested Time: 75 minutes

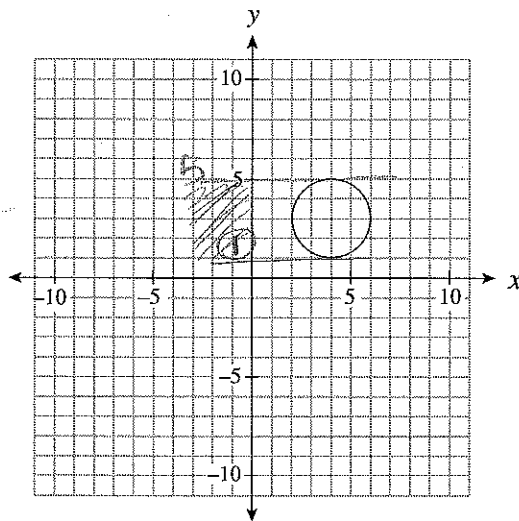
**INSTRUCTIONS:** For each question, select the **best** answer and record your choice on the **white Answer Sheet** provided. Using an HB pencil, completely fill in the bubble that has the letter corresponding to your answer.

13. 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?



because the jar has mass

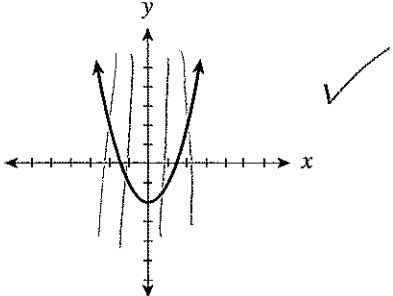
14. What is the range of the graph below?



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

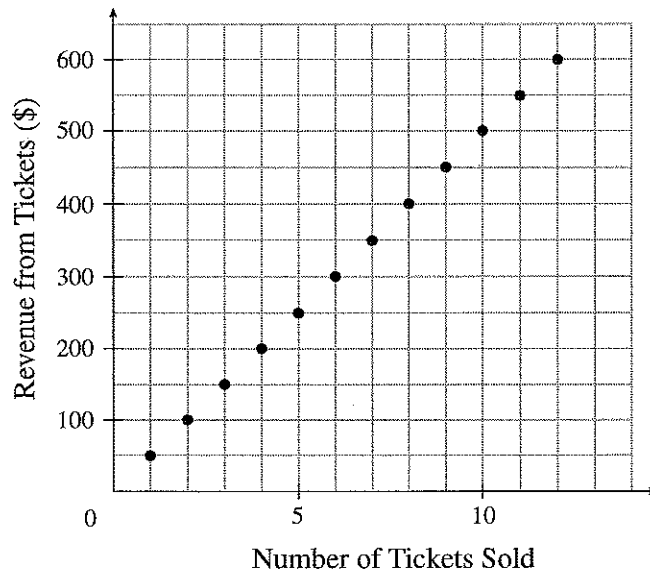
15. Which of the following relations are also functions?

I.	$\{(0, 2), (1, 4), (3, 6), (4, 5), (4, 3), (7, -8)\}$
II.	$y = 2x + 5 \rightarrow m_1 = m_2 \rightarrow 2m_1 = 2m_2 \rightarrow 2m_1 + 5 = 2m_2 + 5$
III.	The output is 6 more than half the input. ✓
IV.	

$y, y_0$   
 $2m_1 + 5 = 2m_2 + 5$   
 it's function ←

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

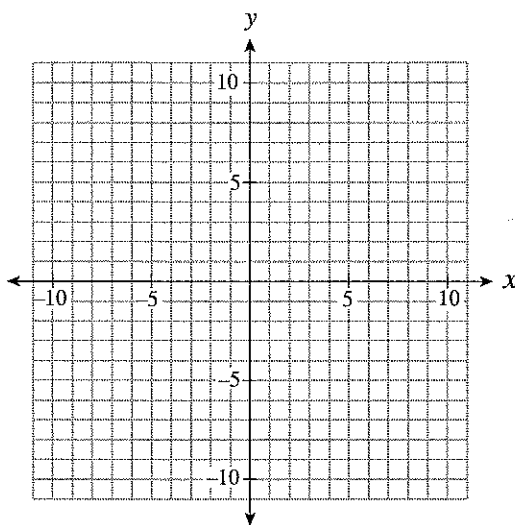
16. What does the slope represent in the graph below?



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



The grid below may be used for rough work to answer question 17.



17. 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.  $(9, 3)$

$$\text{slope} = \frac{2}{3} \quad \begin{matrix} 16 \\ 10 \end{matrix}$$

$$0 = 6\left(\frac{2}{3}\right) + b \rightarrow$$

$$b = -4 \rightarrow y = \frac{2}{3}x - 4 \rightarrow$$

$$y = \frac{2}{3} \times (-3) - 4 = -6 \quad \begin{matrix} -2 \\ -3 \\ -6 \end{matrix} \checkmark$$

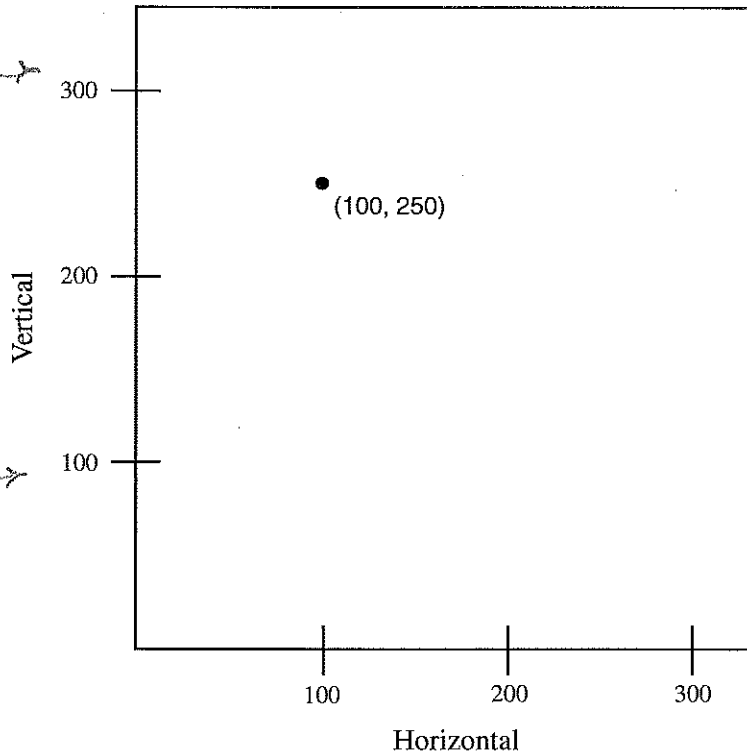
$$y = \frac{2}{3} \times 3 - 4 = -2 \quad \begin{matrix} +3 \\ -2 \end{matrix} \times$$

$$y = \frac{2}{3} \times 4 - 4 \quad \times$$

$$y = \frac{2}{3} \times 9 - 4 = 2 \quad (9, 2) \times$$

18. A video game programmer needs to simulate a shot on a gaming screen. The shot needs to have a slope of  $\frac{6}{5}$  to a target at (100, 250). If the shooter has a horizontal position of 65, what would be the shooter's position on the screen?

Video Screen



$$y = ax + b \rightarrow$$

$$250 = \frac{100 \cdot (6)}{5} + b \rightarrow$$

$$b = 130 \rightarrow$$

$$y = \frac{6}{5}x + 130 \rightarrow$$

$$y = \frac{6}{5}(65) + 130 \rightarrow$$

$$y = 208 \rightarrow$$

$$(65, 208)$$

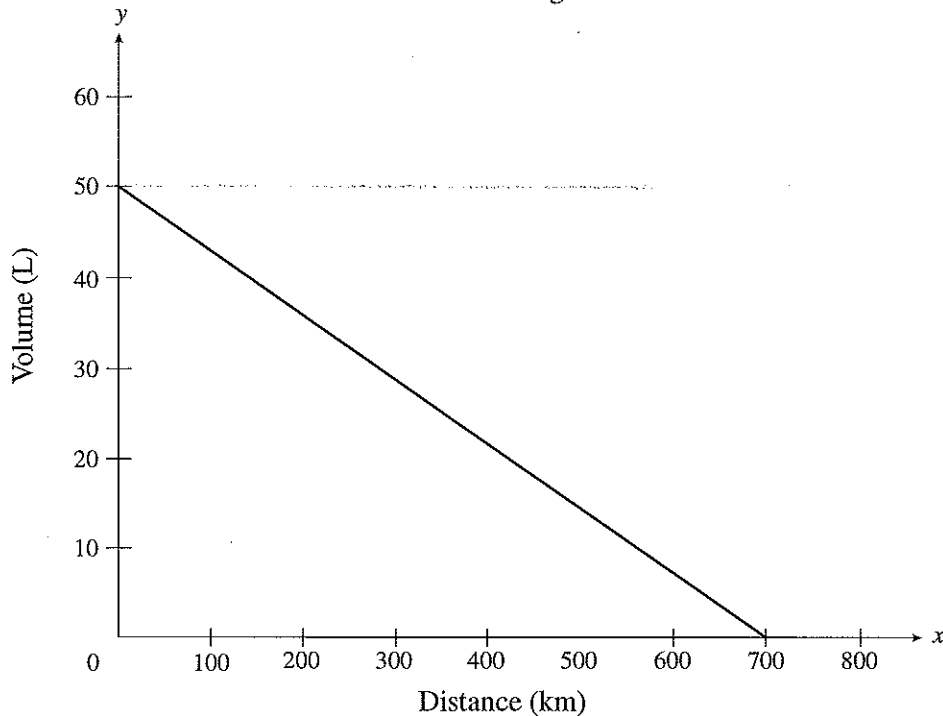
- A. (65, 78)
- B. (65, 125)
- ~~C. (65, 208)~~
- D. (65, 220.8)

19. 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

Use the following graph to answer question 20.

Amount of Gasoline Remaining vs. Distance Driven

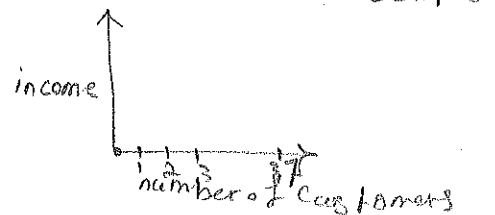


20. The graph above shows the relationship between the amount of gasoline remaining in a 50 L tank and the distance driven for a certain car.

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
- 
21. 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.  $\{0, 1, 2, 3, \dots\}$
- B.  $\{0, 1, 2, 3, \dots, 37\}$
- C. all real numbers
- D. all real numbers between 0 and 37



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

$$5\left(y = \frac{x}{5} - 6\right) \rightarrow$$

A.  $\frac{x}{5} - y - 6 = 0$

$$5y = x - 30 \rightarrow$$

B.  $x + 5y - 6 = 0$

$$5y - x + 30 = 0$$

~~C.  $x - 5y - 30 = 0$~~

or

D.  $5x - 5y - 30 = 0$

$$x - 5y - 30 = 0$$

23. 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.  $A > 0, B < 0, C < 0$

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

I.	$y + 3 = 0$	no slope
II.	$2x + y = 6$	✓
<del>III.</del>	<del><math>(y + 2) = -4(x - 5)</math></del>	<del>✓</del>

27.  $y > 0$

A. II only

B. III only

C. I and III only

D. II and III only

$$y + 2 + 4x + 20 = 0 \rightarrow$$

$$y + 4x + 22 = 0 \rightarrow$$

$$1 > 0 \quad 4 > 0 \rightarrow \text{slope} < 0$$

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

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

I.	The y-intercept is $-2$ . <del>X</del> IS 2
II.	The line is parallel to $y = 2x$ . <del>X</del> The slope is not equal
III.	The slope-intercept form of the line is $y = \frac{2}{3}x + 2$ . <del>X</del>
IV.	The range is all real numbers. ✓

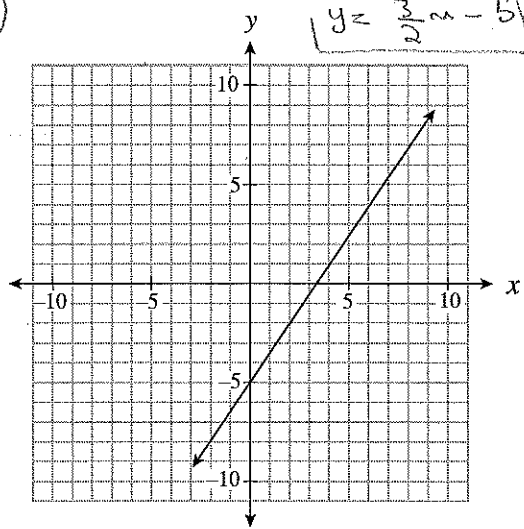
- A. IV only
- B. I and II only
- C. I and IV only
- D. III and IV only

26. Which of the following graphs represents a line that passes through (6, 4) and is

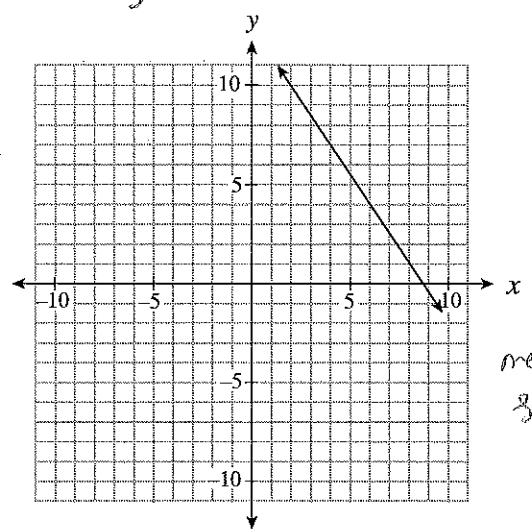
perpendicular to  $y = -\frac{2}{3}x$ ?   
 $\rightarrow$  slope is  $\frac{3}{2}$    
 $y = \frac{3}{2}x - 5$

$4 = \frac{3}{2}(6) + b \rightarrow b = -5 \rightarrow$

A.

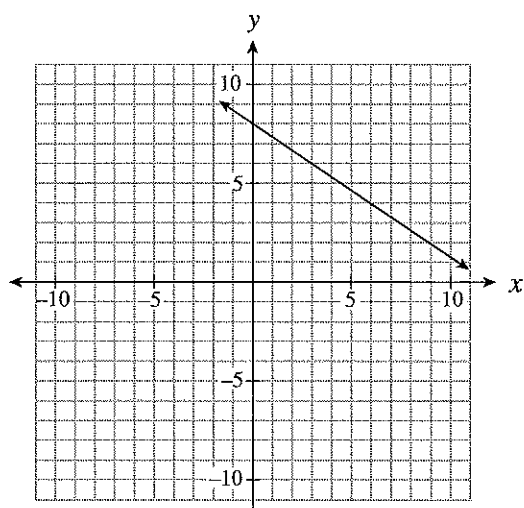


B.



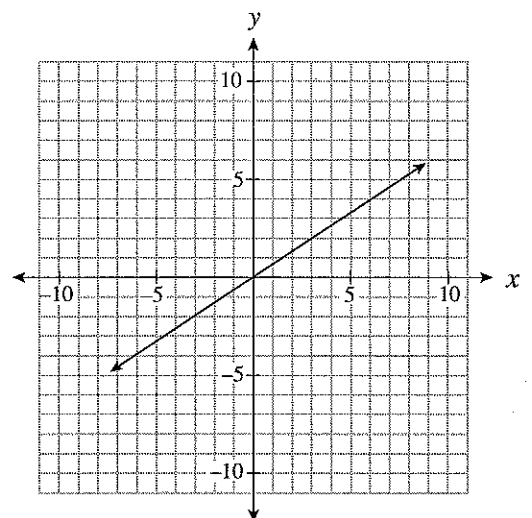
negative slope

C.



negative slope

D.



y intercept is 0 X

27. 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  $B(-3, 1)$ .  $\rightarrow$  slope is equal

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

$$y + 5 = \left( \frac{-5 - 1}{-1 - (-3)} \right) (x - (-1)) \rightarrow$$

slope

$$y + 5 = -3x - 3 - 2 \quad \rightarrow \quad y = -3x - 8$$

$$3 = \frac{-3(-4) + b}{12} \rightarrow b = -9 \rightarrow y = -3x - 9$$

28. 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.  $y = 2x - 80$

$$(90, 100) \quad (25, -30) \rightarrow$$

$$y - 100 = \left( \frac{100 - (-30)}{90 - 25} \right) (x - 90)$$

$$y = 2x - 80$$

29. Which ordered pair represents  $f(3) = -5$ ?  $\rightarrow (3, -5)$

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

30. 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

$$y = 2x - 1 = 0 \quad \rightarrow \quad y - 2x - 1 = 0$$

$$2(x + 7) = 0 \quad \rightarrow \quad 2x + 14 = 0$$

$$y + 13 = 0 \rightarrow y = -13$$

$$-13 = 2x + 1 \rightarrow -14 = 2x \rightarrow x = -7$$

$(-7, -13)$   
 $\rightarrow$  3rd quadrant

31. 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.  $12x + y = 8$   
 $x + 18y = 108$

$$\left. \begin{array}{l} 12x + 18y = 108 \\ 12(x+y) = 96 \end{array} \right\} \rightarrow \begin{array}{l} 6y = 12 \rightarrow \\ y = 2 \end{array}$$

32. 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

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

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

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

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

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



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

$$\sqrt[3]{5 \times 3^3 \times 2^3} \rightarrow 2 \times 3 \sqrt[3]{5} \rightarrow \sqrt[3]{615}$$

A.  $2\sqrt[3]{135}$

B.  $3\sqrt[3]{40}$

C.  $6\sqrt[3]{5}$

D.  $6\sqrt[3]{30}$

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

$$\rightarrow 27a^6$$

A.  $9a^6$

B.  $27a^6$

C.  $36a^8$

D.  $108a^9$

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

$$\frac{1}{\sqrt[3]{-c^2}} \rightarrow$$

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

B.  $\frac{1}{\sqrt[3]{c^2}}$

C.  $\frac{1}{\sqrt{-c^3}}$

D.  $\sqrt[3]{c^2}$

2

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

Handwritten work for question 37:  $\frac{x\sqrt{x}}{x\sqrt[3]{x}} = \frac{x^{\frac{1}{2}}}{x^{\frac{1}{3}}} \rightarrow x^{\frac{1}{2}-\frac{1}{3}} = x^{\frac{1}{6}} \rightarrow \sqrt[6]{x}$

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

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

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

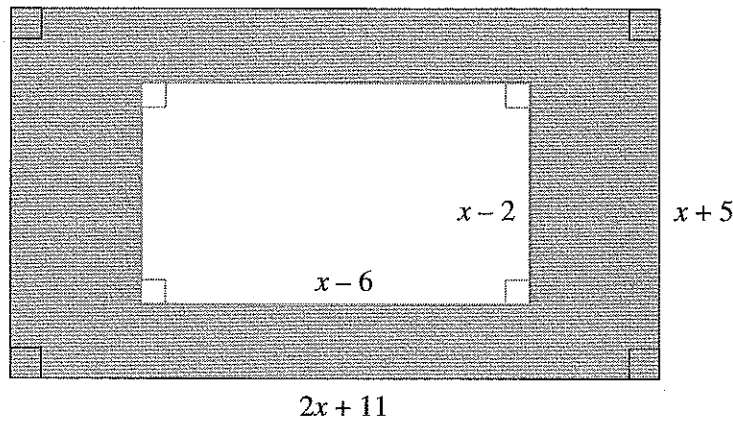
39. Pam expanded and simplified  $(x - 3)(x^2 + 2x - 4)$ , as shown below.

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.

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



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

$$(2x+11)(x+5) - (x-6)(x-2) \rightarrow$$

$$\underbrace{2x^2}_{2x^2} + \underbrace{10x}_{10x} + \underbrace{11x}_{11x} + \underbrace{55}_{55} - \underbrace{x^2}_{x^2} + \underbrace{2x}_{2x} + \underbrace{6x}_{6x} - \underbrace{12}_{12} =$$

$$x^2 + 29x + 43$$

41. 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.  $12x^5y^4$

$$\begin{matrix} 3 \times 2^2 \times x^5 y \\ 2 \times x^3 y^2 \\ 2 \times 3 \times x^2 y^4 \end{matrix} \rightarrow 2x^2y$$

similar things with smallest power

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

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

$$x^2 - 8x - 20 \rightarrow (x-10)(x+2)$$

$$x^2 - 8x - 20 \rightarrow x^2 - 8x - 16 - 4 =$$

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

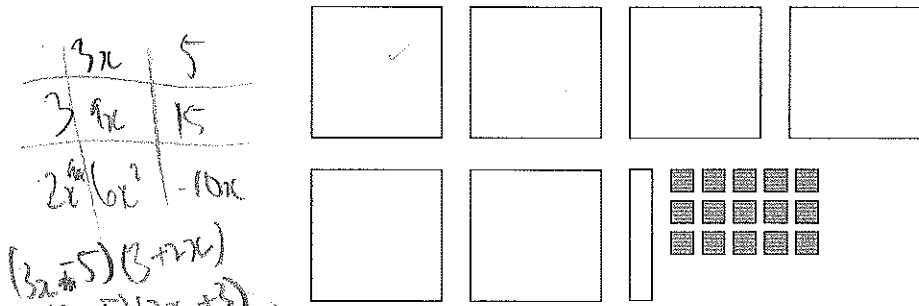
$$(x+2)(x-2-8) = (x+2)(x-10)$$

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

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

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

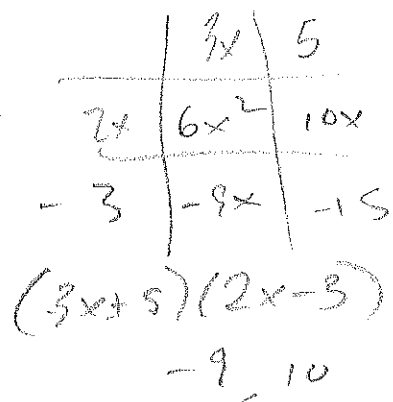
44. Joe was asked to factor  $6x^2 + x - 15$  and represent it with math tiles.



white square =  $x^2$   
white triangle =  $x$   
grey square = negative one

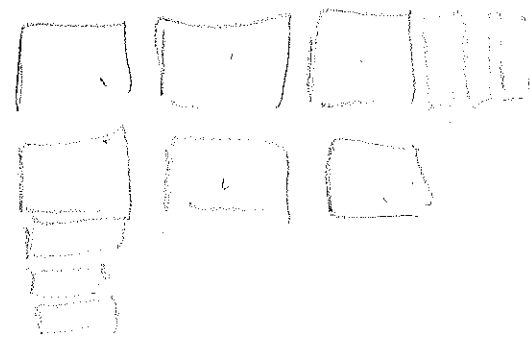
What additional tiles would he need to represent the total area of the two factors?

- A. 8 each of and =  $8x - x = 7x$
- B. 9 each of and =  $9x - x = 8x$
- C. 10 each of and =  $10x - x = 9x$
- D. 11 each of and =  $11x - x = 10x$

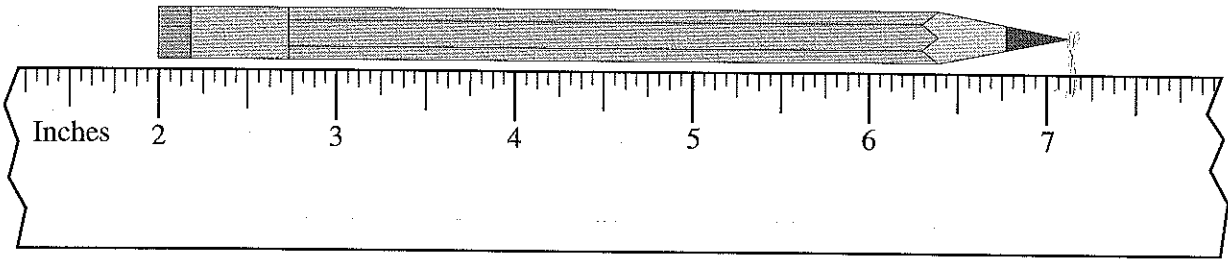


$$\frac{x}{6} (6x^2 + x - 15) = \frac{36x^2 + 6x - 6 \times 15}{6} \rightarrow$$

$$(6x - 6)$$



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



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

B.  $5\frac{2}{10}$ "

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

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

$$5\frac{2}{10}$$

46. 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

$$6 \text{ ft} \times \frac{30.48 \text{ cm}}{1 \text{ ft}} = 182.88 \text{ cm}$$

$$1.82 \text{ m}$$

$$300 \text{ cm}$$

47. Which distance below is the longest?

0.6 mi, 1000 yd, 1 km, 900 m

$$965.4 \text{ m} \quad 914.4 \text{ m} \quad 1000 \text{ m}$$

A. 0.6 mi

B. 1000 yd

C. 1 km

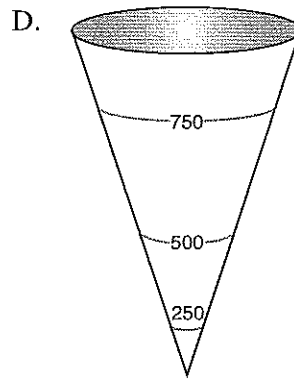
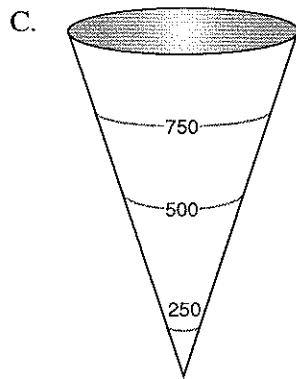
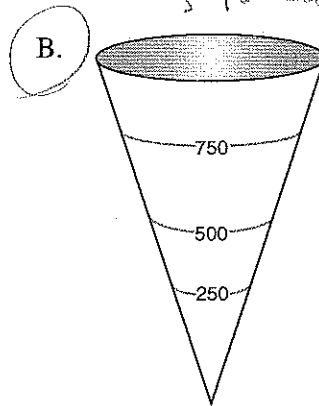
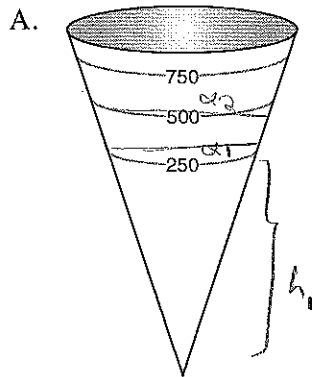
D. 900 m


$$1000 \text{ yd} \times \frac{0.9144 \text{ m}}{1 \text{ yard}} = 914.4 \text{ m}$$

$$0.6 \text{ mi} \times \frac{1.609 \text{ km}}{1 \text{ mile}} \times \frac{1000 \text{ m}}{1 \text{ km}} = 965.4$$

48. 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?

$\frac{1}{3} (\text{area of base}) h$

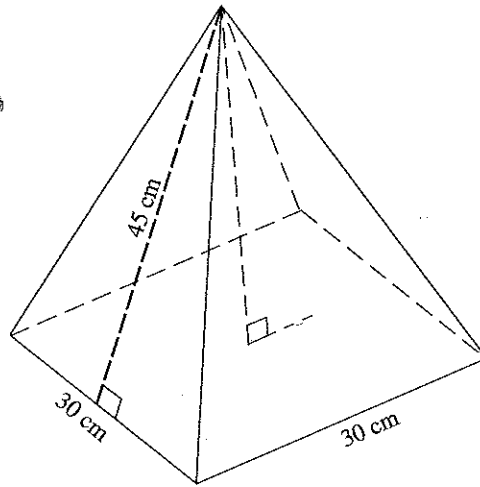


$1000 \text{ Lit} \rightarrow h$    
 $500 \text{ Lit} \rightarrow \frac{h}{2}$   
 $\frac{1}{3} \propto h = 1000 \rightarrow$   
 $\propto h = 3000$   
 $250 \text{ Lit} \rightarrow \frac{h}{4}$

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

$$V = \frac{1}{3} (\text{area of base}) \times h$$

$$V = \frac{1}{3} (900) \times 45 = 13500$$



area of base =

$$30^2 = 900$$

- A. 10 062 cm<sup>3</sup>
- B. 12 728 cm<sup>3</sup>
- C. 13 500 cm<sup>3</sup>
- D. 40 500 cm<sup>3</sup>

50. 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?

$$r = 2.5$$

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

$$\text{diameter} = 10 \rightarrow \text{radius} = 5 \text{ cm}$$

$$\text{height} = 12 \rightarrow \text{half full} \rightarrow h = \frac{12}{2} = 6$$

$$\textcircled{1} \text{ volume of water} = h \times (\text{area of base}) \rightarrow$$

$$V_{\text{water}} = 6 \times \pi r^2 = 6 \times 78.53981634 = 471.2388$$

area of base =

$$\pi r^2 = \pi \times (5)^2 = 78.53$$

$$\textcircled{2} \text{ volume of sphere} = \frac{4}{3} \pi (2.5)^3 = 65.44984695$$

$$\text{volume that went up} = \textcircled{1} - \textcircled{2} = 405.7890511 \rightarrow$$



new volume of volume that went up

$$\text{new } V = (\text{area of base}) \times h \rightarrow$$

$$405.7890511 = 78.53 \times h \rightarrow$$

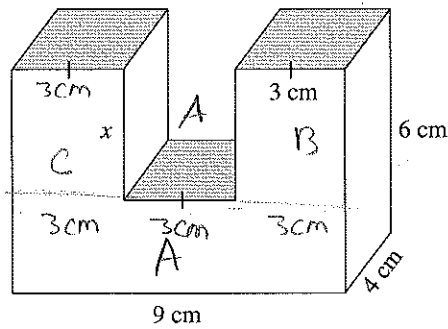
$$h = 5.1666 \text{ cm} \approx 5$$

51. The volume of the object below is  $186 \text{ cm}^3$ . Calculate the length of  $x$ .

Box

$$216 - 12x = 186 \rightarrow$$

$$x = 2.5$$



A. 3.1 cm

B. 2.5 cm

C. 1.75 cm

D. 1.25 cm

volume object = volume of the Big Prism - volume of

$$\text{small prism} = x \times 3 \times 4$$

Small  
Prism

$$\text{Big P} = 9 \times 4 \times 6 \rightarrow$$

$$\text{volume object} = 186$$

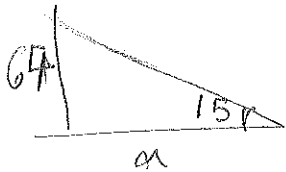
52. The angle of elevation of the sun is  $15^\circ$ . How long is the shadow of a 64 m tall building?

A. 17 m

B. 66 m

C. 239 m

D. 247 m

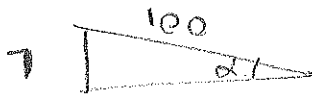


$$\tan 15 = \frac{64}{x} \rightarrow$$

$$x = 238.85 = 239 \text{ m}$$

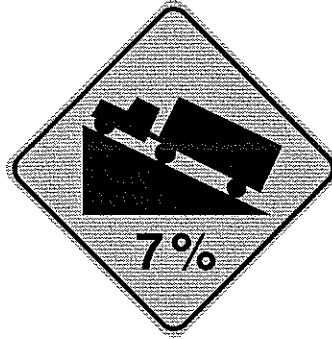


53. As Tracey is driving, she sees a sign telling her the road has a 7% grade (i.e., a rise of 7 metres for a horizontal change of 100 m). Which of the following expressions will calculate the angle between the road and the horizontal?



$$\sin \alpha = \frac{7}{100} \rightarrow$$

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



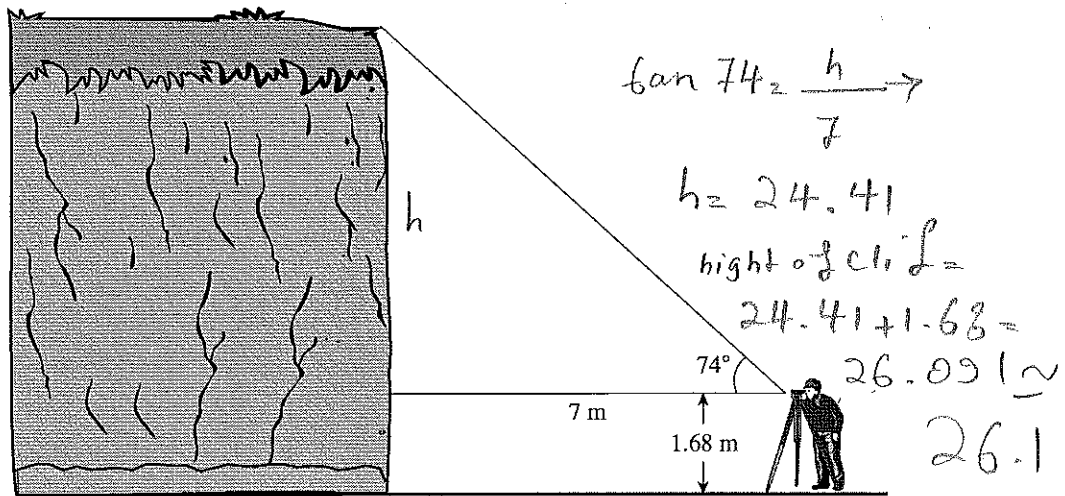
A.  $\tan\left(\frac{7}{100}\right)$

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

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

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

54. 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

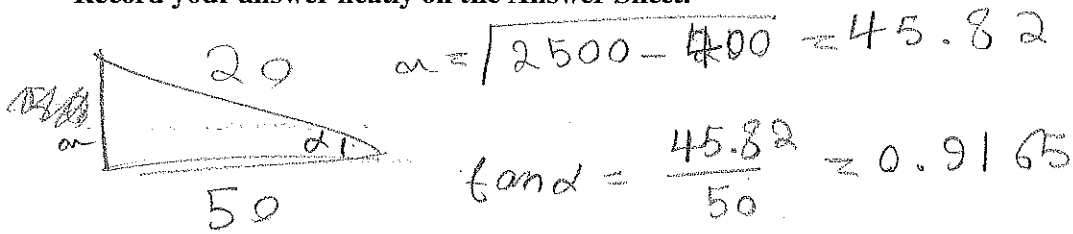
B. 8.4 m

C. 24.4 m

D. 26.1 m

55. 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.

Record your answer neatly on the Answer Sheet.



56. 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.

Record your answer neatly on the Answer Sheet.

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

57. 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.

Record your answer neatly on the Answer Sheet.

$$166 = 0.15k + 22 \rightarrow$$

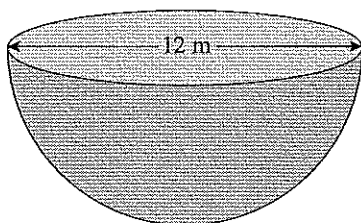
$$k = 960$$

58. 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.

**Record your answer neatly on the Answer Sheet.**

$$\frac{10000}{2^4} = 625$$

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



**Record your answer neatly on the Answer Sheet.**

$$\frac{4\pi(6)^2}{2} + \pi(6)^2 = 339.292$$

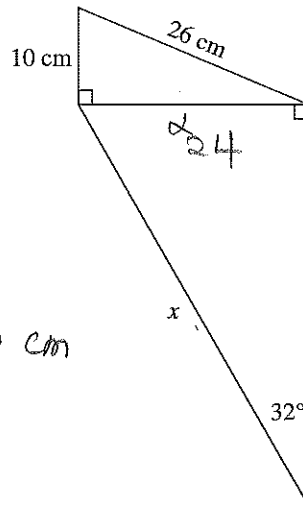
60. Calculate the length of side  $x$  on the diagram below. Answer to the nearest centimetre.

$$x^2 + 10^2 = 26^2 \rightarrow$$

$$x = 24$$

$$\sin 32^\circ = \frac{24}{x} \rightarrow$$

$$x = 45.289 \text{ cm}$$



Record your answer neatly on the Answer Sheet.

You have **Examination Booklet Form B**. In the box above #1 on your **Answer Sheet**, ensure you filled in the bubble as follows.

Exam Booklet Form/ Cahier d'examen	A	B	C	D	E	F	G	H
	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>