



Worked  
Answerkey

**Foundations of Mathematics  
and Pre-Calculus 10  
Examination Booklet  
Sample 2010 – 2011 Sample B**

**DO NOT OPEN ANY EXAMINATION MATERIALS UNTIL INSTRUCTED TO DO SO.**

**Examination Instructions**

1. On your Answer Sheet, fill in the bubble (Form A, B, C, D, E, F, G or H) that corresponds to the letter on this Examination Booklet.
2. You may require a protractor and a ruler (metric and imperial).
3. You may use math tiles.
4. When using your calculator (scientific or approved graphing calculator):
  - use the programmed value of  $\pi$  rather than the approximation of 3.14.
  - round only in the final step of the solution.
5. Diagrams are not necessarily drawn to scale.
6. When the examination begins, remove the data pages located in the centre of this booklet.
7. Read the Examination Rules on the back of this booklet.

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

Value: 12 marks

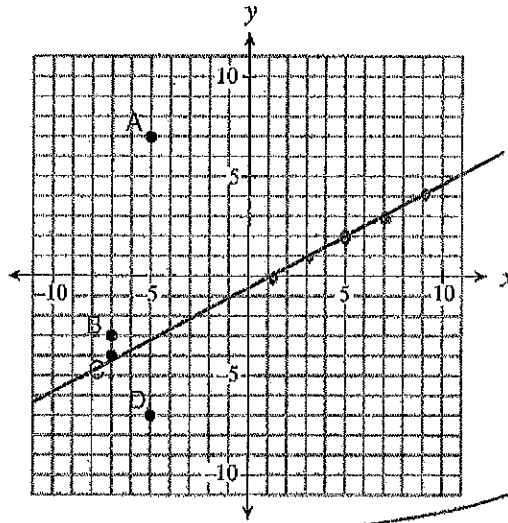
Suggested Time: 30 minutes  
Allowable Time: 40 minutes

**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.

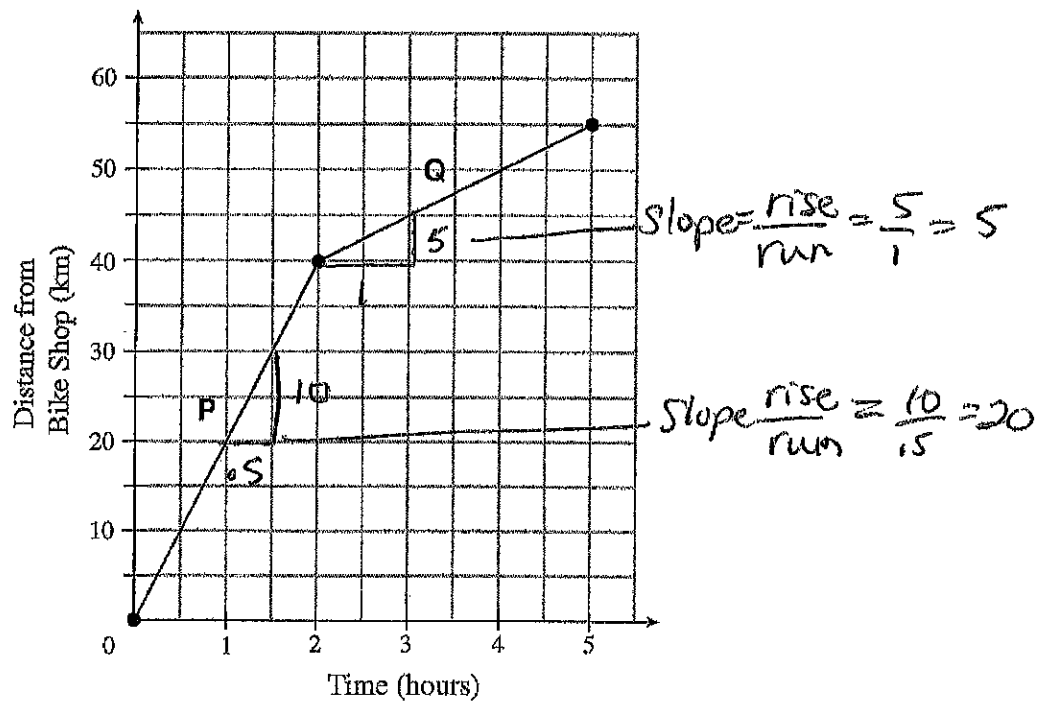


$P(5, 2)$   
Slope  $\frac{1}{2}$

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

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

Change  $20 - 5 = 15$

3. Solve the following system of equations:

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

elimination

$$\begin{array}{r} 4x + 2y = 8 \\ (-3x + y = -1) \cdot 2 \\ \hline 4x + 2y = 8 \\ -6x + 2y = -2 \\ \hline 10x = 10 \\ x = 1 \end{array}$$

$$\begin{array}{r} 4(1) + 2y = 8 \\ -4 \qquad \qquad -4 \\ \hline 2y = 4 \\ y = 2 \end{array}$$

(

Substitution

$$\begin{array}{r} y = 3x - 1 \\ 4x + 2(3x - 1) = 8 \\ 4x + 6x - 2 = 8 \\ 10x = 10 \\ x = 1 \end{array}$$

plug back in

$$\begin{array}{r} 4(1) + 2y = 8 \\ -4 \qquad \qquad -4 \\ \hline 2y = 4 \\ y = 2 \end{array}$$

(1, 2)

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

$$y = 3x + 7$$

$$y = 3x - 4$$

none  
the slopes are the same so they will never meet

- 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 36 54 **72**  
24 48 **72**

72  
2 1 3 6  
2 1 3 2 3  
=  $2^3 \times 3^2$

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

- A. 360
- B. 12
- C. 6
- D. 2

12 - 1 2 3 4 **6** 12  
24 = 1 2 3 4 **6** 8 12 24  
30 - 1 2 3 **6** 10 15 30  
72 - 1 2 3 4 **6** 8 9 12 18 24 36 72

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

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

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

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

I.	$-3\sqrt{2}$	$\sqrt{2} \times -3 = -4.2$
II.	$\sqrt{9}$	$= 3$
III.	$2\sqrt{3}$	$\sqrt{3} \times 2 = 3.5$
IV.	$-2\sqrt{7}$	$\sqrt{7} \times -2 = -5.29$

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:  $(2x^3)^3 \cdot 3x^4$

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

$$2^3 \times 3 \cdot 3 \cdot 3 \cdot 3x^4$$

$$8 \times 9 \cdot 3x^4 = 24x^{9+4} = 24x^{13}$$

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

$$1000 \text{ ft} \times 30.48$$

$$= 30480 \text{ cm}$$

$$\div 100 = 304.8 \text{ m}$$

$$304.8 \text{ m} \div 1000$$

$$= 0.3048 \text{ km}$$

$$1 \text{ ft} = 30.48 \text{ cm}$$

$$1 \text{ km} = 1000 \text{ m}$$

$$1 \text{ m} = 100 \text{ cm}$$

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

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

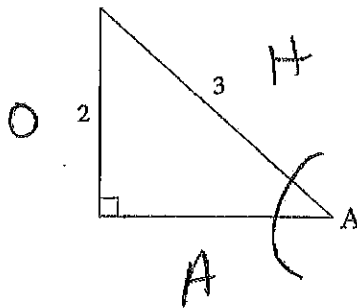
B.  $4 \text{ yd} \times \frac{3 \text{ ft}}{1 \text{ yd}} \times \frac{2.54 \text{ cm}}{1 \text{ ft}}$

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

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

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



To find A

$$c^2 - b^2 = a^2$$

$$3^2 - 2^2 = a^2$$

$$9 - 4 = a^2$$

$$\sqrt{5} = a$$

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

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

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

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

So -  $\cos = \frac{A}{H}$

$$= \frac{\sqrt{5}}{3}$$

**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.

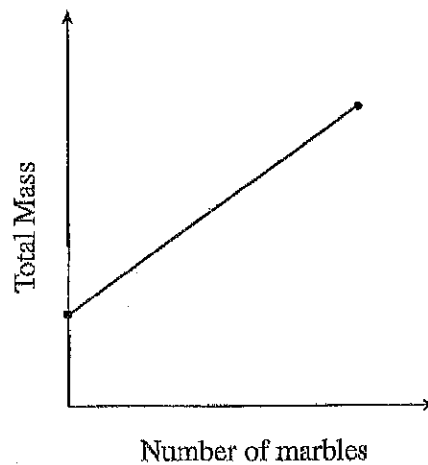
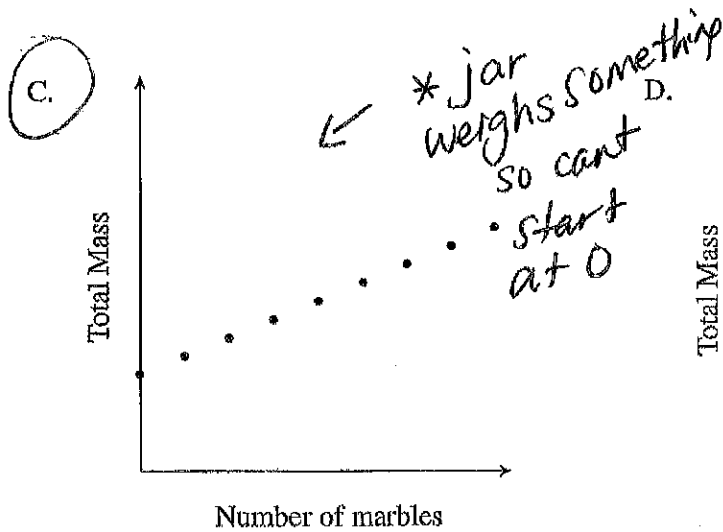
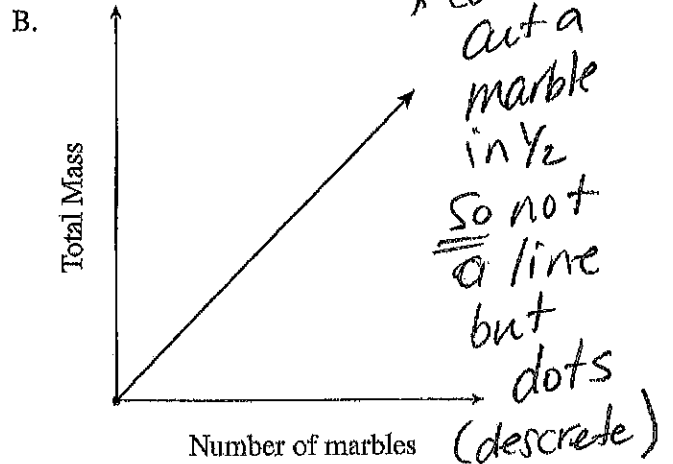
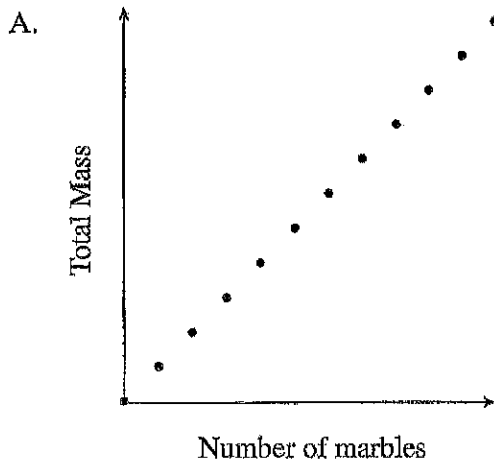
**PART B: MULTIPLE-CHOICE QUESTIONS**  
(calculator permitted)

Value: 42 marks

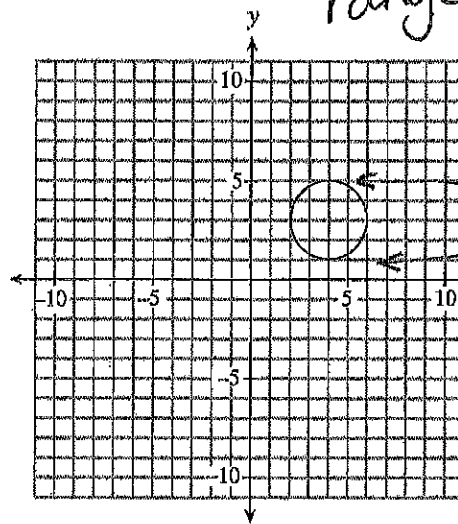
Suggested Time: 75 minutes

**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?



14. What is the range of the graph below?



range = y values

5

1

$[1, 5]$

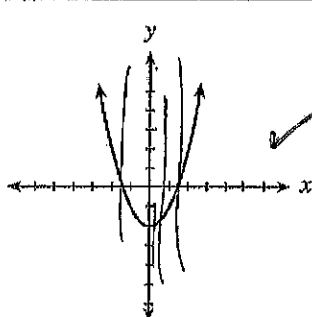
I.	All $x$ values between 2 and 6 inclusive.
II.	$(2, 6)$
III.	$[1, 5]$
IV.	$1 \leq y \leq 5$

$y \leq 5$   
 $y \geq 1$

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



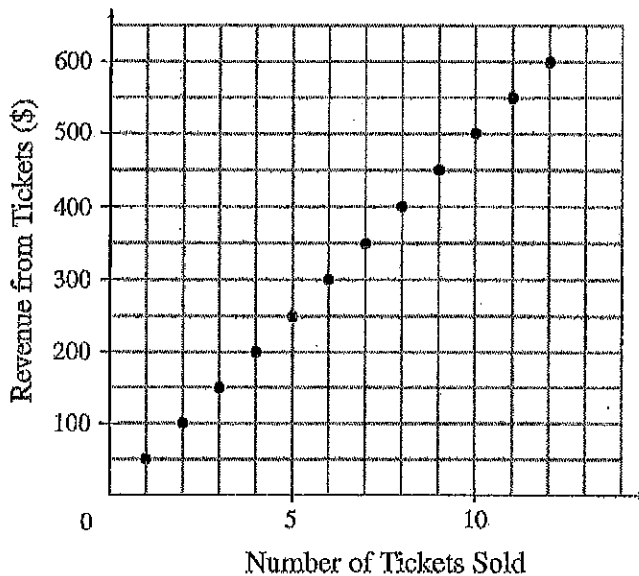
15. Which of the following relations are also functions? \*

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

D

- 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?



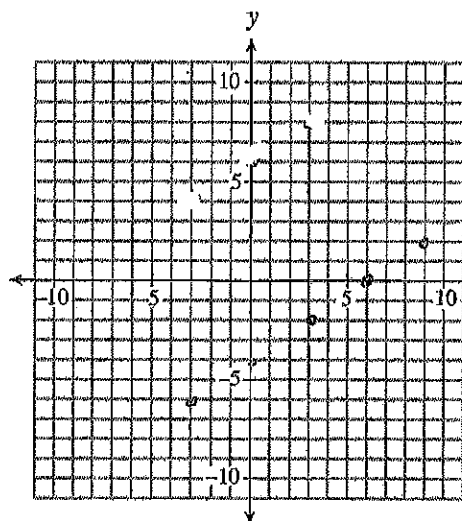
$$\text{slope} = \frac{\text{rise}}{\text{run}}$$

$$= \frac{\text{Revenue}}{\# \text{ tickets}}$$

$$= \$ / \text{ticket}$$

- 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.

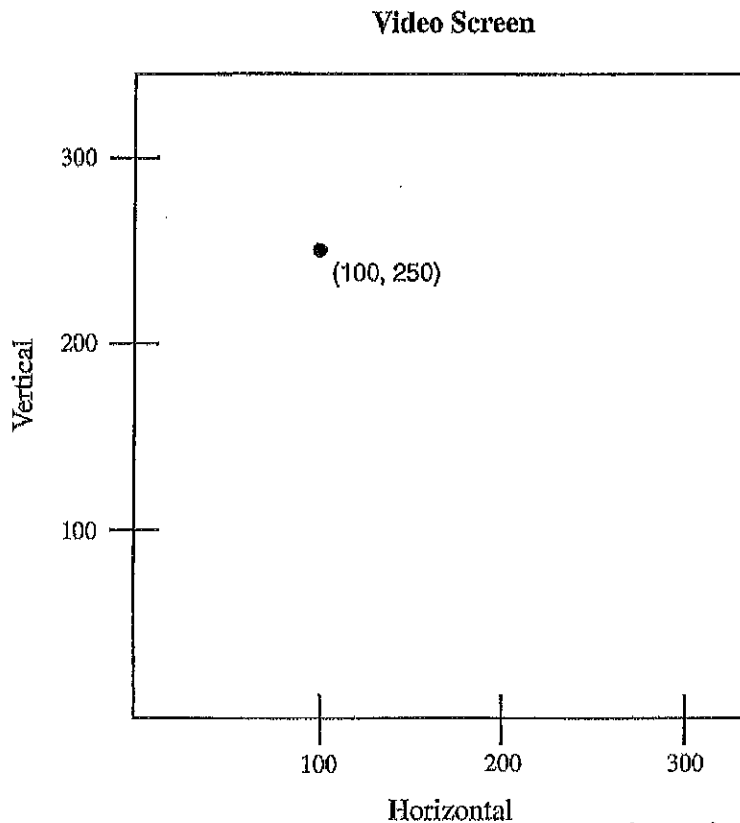


$(6,0)$   $\frac{2}{3}$   $\uparrow$  up  
 $\rightarrow$  over

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.  $(9, 3)$

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?



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

$$y = mx + b$$

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

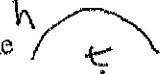
$$250 = 120 + b \therefore b = 130$$

$$-120 \quad -120$$

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

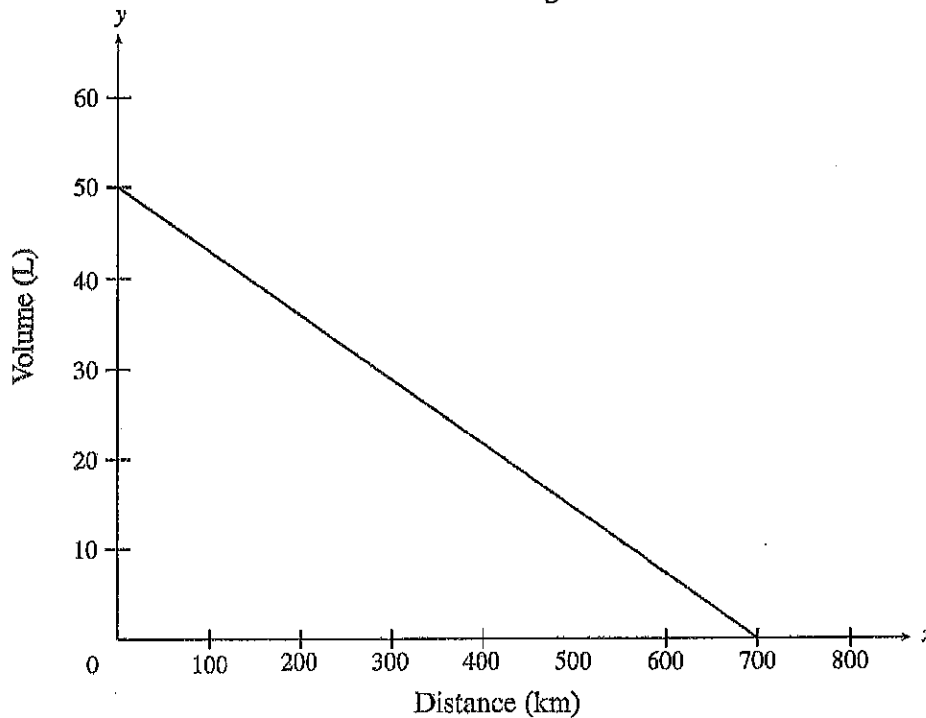
$$y = 208$$

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.  $\{0, 1, 2, 3, \dots\}$  - doesn't have infinite # of customers at this time  
B.  $\{0, 1, 2, 3, \dots, 37\}$  - has 37 customers (possibly) max is 37  
C. all real numbers  $\rightarrow$  can't have  $\frac{1}{2}$  a customer so can't be  
D. all real numbers between 0 and 37  $\nearrow$   
all real numbers

22. 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.  $5x - 5y - 30 = 0$

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

$$5y = x - 30$$

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

$$+30 \quad +30$$

$$-1(-x + 5y + 30 = 0) \quad x - 5y - 30 = 0$$

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

$$Ax + By + C = 0$$

$$-Ax \quad -C$$

$$\frac{By}{B} = \frac{-Ax - C}{B} \quad \text{for } \frac{-C}{B} = + \quad C = + \quad B = -$$

$$\text{for } \frac{-A}{B} = + \quad A = + \quad B = -$$

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

I.	$y + 3 = 0$
<input checked="" type="radio"/> II.	$2x + y = 6$
<input checked="" type="radio"/> III.	$(y + 2) = -4(x - 5)$

$\rightarrow y = -3$  zero slope

$y = -2x + 6$  neg. slope

↑  
neg slope

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

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

I.	The y-intercept is $-2$ .	<del>X</del>
II.	The line is parallel to $y = 2x$ .	<del>no X</del>
III.	The slope-intercept form of the line is $y = \frac{2}{3}x + 2$ .	<del>X</del> no
IV.	The range is all real numbers.	✓

Slope is  $-\frac{2}{3}$   
 makes a line goes on forever  
 ↑  
 ↓

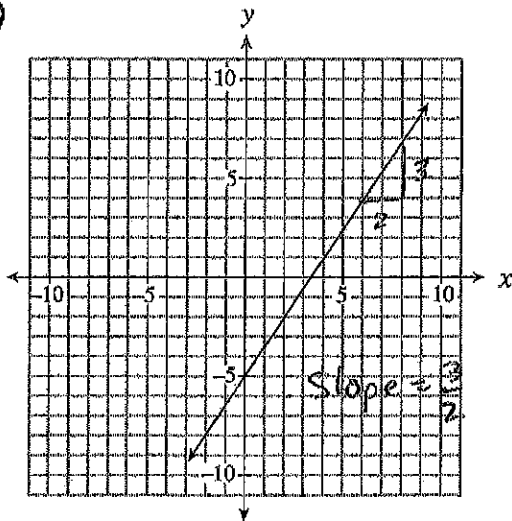
- A. IV only
- B. I and II only
- C. I and IV only
- D. III and IV only

$$\begin{aligned}
 2x + 3y &= 6 \\
 -2x & \quad -2x \\
 \hline
 3y &= -2x + 6 \\
 \frac{3y}{3} &= \frac{-2x}{3} + \frac{6}{3} \\
 y &= -\frac{2}{3}x + 2 \quad \text{y int} = 2
 \end{aligned}$$

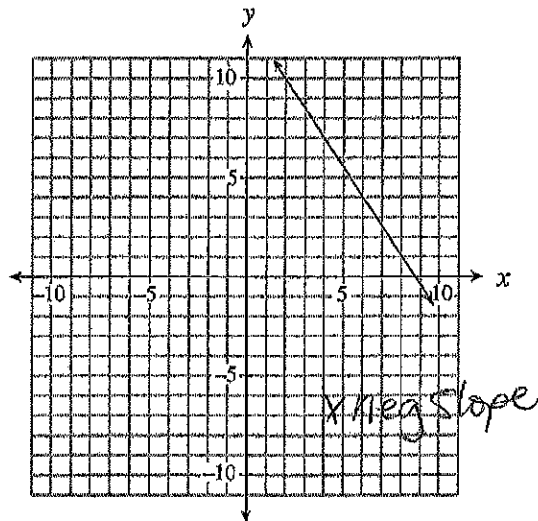
26. Which of the following graphs represents a line that passes through (6, 4) and is

perpendicular to  $y = -\frac{2}{3}x$ ? *perp slope =  $(-\frac{2}{3})^{-1} = \frac{3}{2}$*

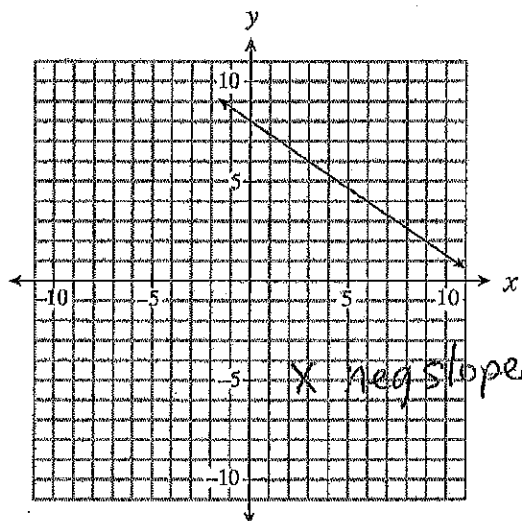
A.



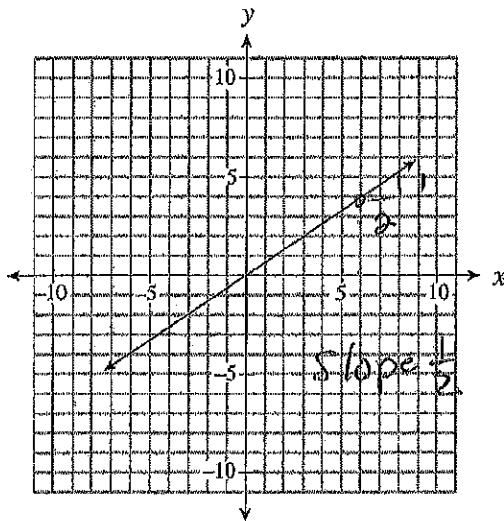
B.



C.



D.



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  $B(-3, 1)$ .

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

↳ slope =  $\frac{1 - (-5)}{-3 - (-1)} = \frac{6}{-2} = -3$

$y = -3x + b$

$3 = -3(-4) + b$      $b = -9$   
 $12 = 12$

$y = -3x - 9$

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.  $y = 2x - 80$

$0.5(90) + 55$   
 $= 45 + 55$   
 $y = 100$  ✓  
 $y = 0.5(25) + 55$   
 $\neq -30$   
 $y = 2(90) - 80$   
 $= 100$  ✓  
 $y = 2(25) - 80$   
 $= -30$  ✓

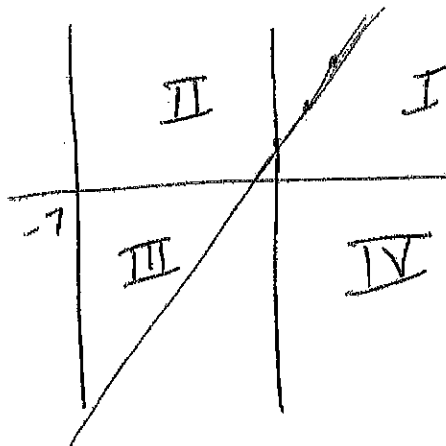
29. Which ordered pair represents  $f(3) = -5$ ?

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

$f(3) = -5$   
 $\begin{matrix} | & | \\ x & y \\ \hline & \end{matrix}$   
 $(3, -5)$

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



or  
 $y = 2(-7) + 1$   
 $= -14 + 1$   
 $= -13$   
 $-13 = 2(x) + 1$   
 $-14 = 2x$   
 $x = -7$

$P(-7, -13)$   
 III



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.  $x + y = 8$  books  
 $12x + 18y = 108$  cost

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

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

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

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

price  $(x + y = 1500)$   $0.08$   
 interest  $0.08x + 0.1y = 132$   
 $- 0.08x + 0.08y = 120$   


---

 $0.02y = 12$   $y = 600$

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

A.  $\left\{-\frac{3}{4}, 7.1, \sqrt{16}\right\}$   
 B.  $\left\{\frac{1}{2}, -6, \frac{\sqrt{5}}{2}\right\}$  not rational  
 C.  $\{-3, 4.\overline{23}, 4.121314\dots\}$  not rational  
 D.  $\{\sqrt{10}, 3\sqrt{9}, \pi\}$  not rational

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

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

Handwritten solution for Question 34:

$$\sqrt{1080}$$

$$\begin{array}{r} 2 \overline{) 1080} \\ \underline{4} \phantom{00} \\ 680 \\ \underline{600} \\ 800 \\ \underline{600} \\ 200 \end{array}$$

$$\begin{array}{r} 2 \overline{) 270} \\ \underline{270} \\ 0 \end{array}$$

$$\begin{array}{r} 2 \overline{) 70} \\ \underline{60} \\ 10 \\ \underline{10} \\ 0 \end{array}$$

$$\begin{array}{r} 2 \overline{) 5} \\ \underline{4} \\ 1 \end{array}$$

$$2 \cdot 3 \sqrt[3]{5} = 6\sqrt[3]{5}$$

Factorization tree for 1080:  $1080 = 2 \cdot 540 = 2 \cdot 2 \cdot 270 = 2 \cdot 2 \cdot 2 \cdot 135 = 2 \cdot 2 \cdot 2 \cdot 3 \cdot 45 = 2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 5 = 2^3 \cdot 3^3 \cdot 5$

35. Simplify:  $(3a^2)^3(4a^3)^0 = 1$

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

Handwritten solution for Question 35:

$$(3a^2)^3 \times 1$$

$$3^3 a^{2 \times 3} = 27a^6$$

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

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

Handwritten solution for Question 36:

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

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

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

$$\begin{aligned} \sqrt{x^3} &= x^{\frac{3}{2}} \\ \sqrt[3]{x^4} &= x^{\frac{4}{3}} \end{aligned} \quad \left. \begin{array}{l} \\ \\ \end{array} \right\} \frac{x^{\frac{3}{2}}}{x^{\frac{4}{3}}} = x^{\frac{3}{2} - \frac{4}{3}} \\ &= x^{\frac{9}{6} - \frac{8}{6}} = x^{\frac{1}{6}} \\ &= \sqrt[6]{x}$$

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

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

$$\begin{aligned} (4x-3)^2 &= (4x-3)(4x-3) \\ &= 16x^2 - 12x - 12x + 9 \\ &= 16x^2 - 24x + 9 \end{aligned}$$

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

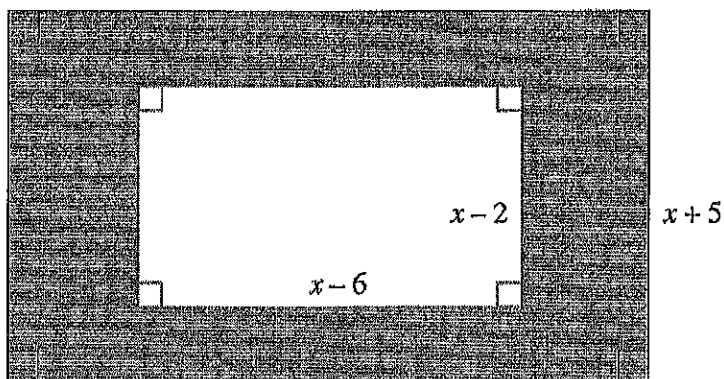
Steps	
I.	$x(x^2+2x-4) - 3(x^2+2x-4)$
II.	$x^3+2x^2-4x-3x^2+6x-12$
III.	$x^3-x^2+2x-12$

In which step is Pam's first error?

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

*should be negative*

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.  $3x^2 + 13x + 67$

**Subtract**

$$A_{\text{large rectangle}} = (2x+11)(x+5)$$

$$= 2x^2 + 10x + 11x + 55$$

$$= 2x^2 + 21x + 55$$

$$A_{\text{small rectangle}} = (x-6)(x-2)$$

$$= x^2 - 2x - 6x + 12$$

$$= x^2 - 8x + 12$$

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.  $12x^5y^4$
- $12 - 1 \overline{) 2 \ 3 \ 4 \ 6 \ 12}$   
 $4 - 1 \overline{) 2 \ 4}$   
 $6 - 1 \overline{) 3 \ 6}$
- Smallest  $x = x^2$   
 Smallest  $y = y$

**Subtract**

$$2x^2 + 21x + 55$$

$$- (x^2 - 8x + 12)$$


---


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

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

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

120

$$(x-10)(x+2) \begin{matrix} 120 \\ 210 \\ 45 \end{matrix}$$

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

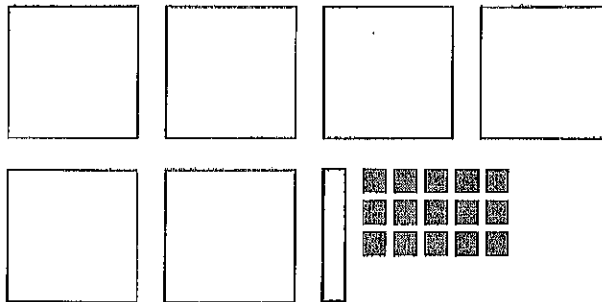
- A. 2
- B. 3
- C. 4
- D. 5

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

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

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

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



$$6x^2 - 15 = \frac{-9 \pm 10}{1}$$

Sum of 1

$$6x^2 - 9x + 10x - 15$$

$$= 3x(2x-3) + 5(2x-3)$$

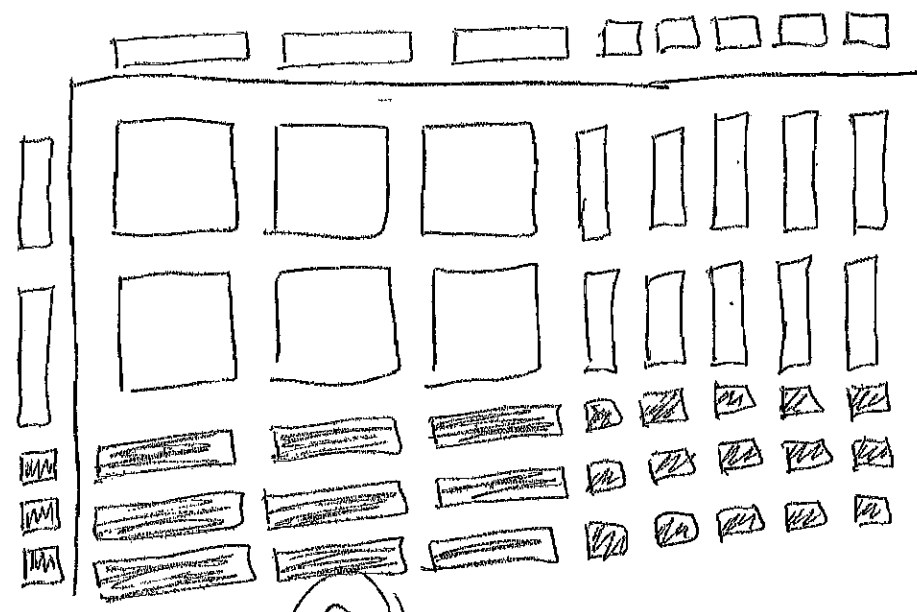
$$= (3x+5)(2x-3)$$

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

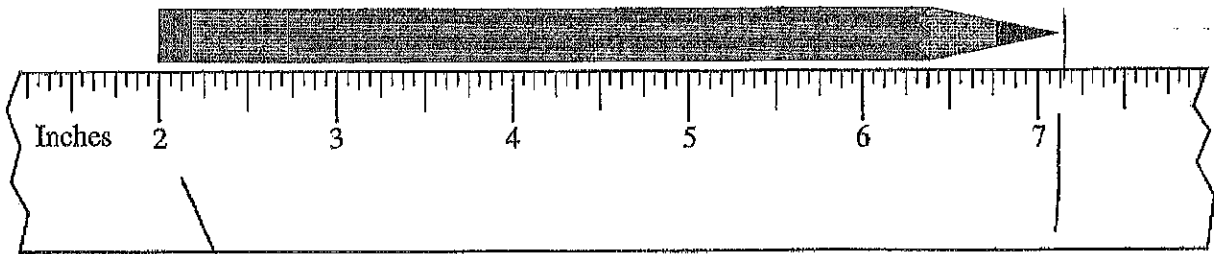
inside only

have 1 need 9 more



9

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



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

B. 5.2"

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

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

Starts at 2

$$\begin{array}{r} 7\frac{2}{16} \\ - 2 \\ \hline 5\frac{2}{16} = 5\frac{1}{8} \end{array}$$

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

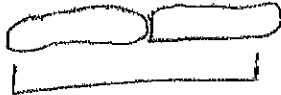
too big  
too big

A. 6 ft

B. 3 m

C. 60 cm

D. 30 in  $\approx 76$  cm



2 steps  $\approx$  1 step less than 1 ft or 30 cm

47. Which distance below is the longest?

0.6 mi, 1000 yd, 1 km, 900 m

$$1000 \times 0.9144 = 914.4 \text{ m}$$

A. 0.6 mi

B. 1000 yd

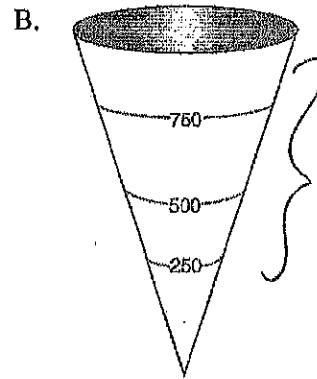
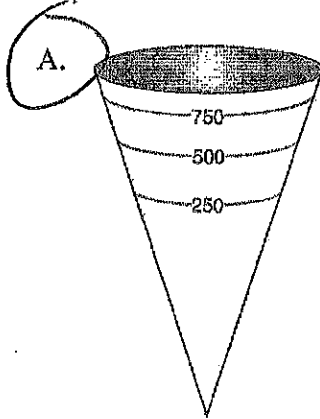
C. 1 km

D. 900 m

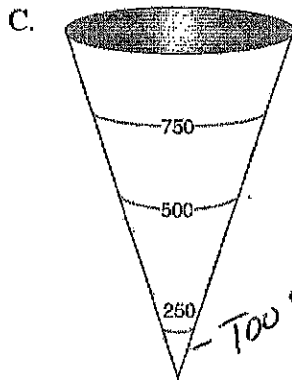
1000m      900m

$$\begin{aligned} 0.6 \times 1.609 \\ = 0.965 \text{ km} \\ \text{or } 965 \text{ m} \end{aligned}$$

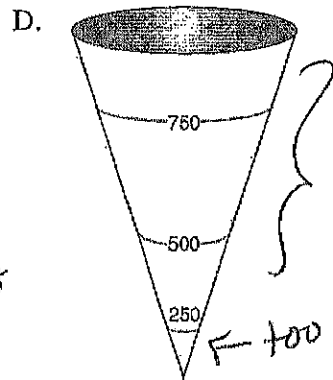
48. A cone-shaped water tank has a volume of 1000 litres. Which diagram best represents the 250 L, 500 L and 750 L marks outside of the water tank?



Can't be equal  
larger radius  
on top - not  
same volume  
as bottom



Too small  
radius small &  
so is height

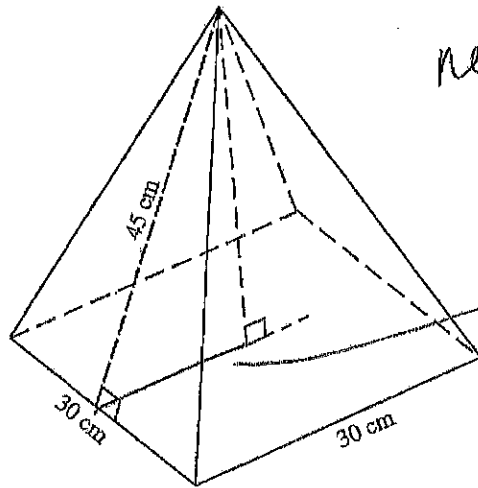


Can't be  
too small to  
be 250 mL

→ Smaller volume  
to smaller radius (need more height to get  
equal volume)

→ larger radius means  
you need less height to equal same  
volume with smaller radius.

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



need h to find  
Volume

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

$$\sqrt{1800} = h$$

$$h = 42.4$$

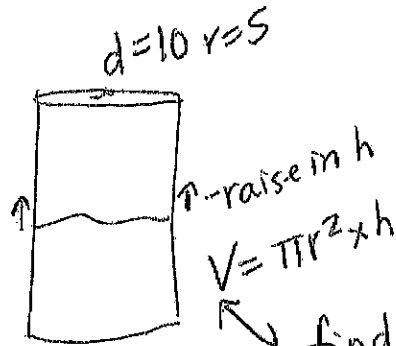
$$V = \frac{\text{base} \times \text{height}}{3} = \frac{30 \times 30 \times 42.4}{3}$$

$$= 12720$$

- 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?

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



find V of sphere & plug in to  
① V of cylinder

$$V_s = \frac{4\pi r^3}{3} = \frac{4\pi (2.5)^3}{3} = 65.4 \text{ - Volume of rise in water}$$

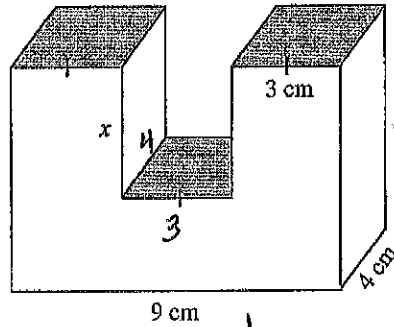
$$V_c = \pi r^2 \times h$$

$$65.4 = \pi (5)^2 \times h$$

$$\frac{65.4}{25\pi} = \frac{65.4}{78.5} = 0.83$$



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



①  $V = V_{\text{whole}} - V_{\text{missing piece}}$   
 Object

$$186 = 216 - V$$

$$30 = V_{\text{missing piece}}$$

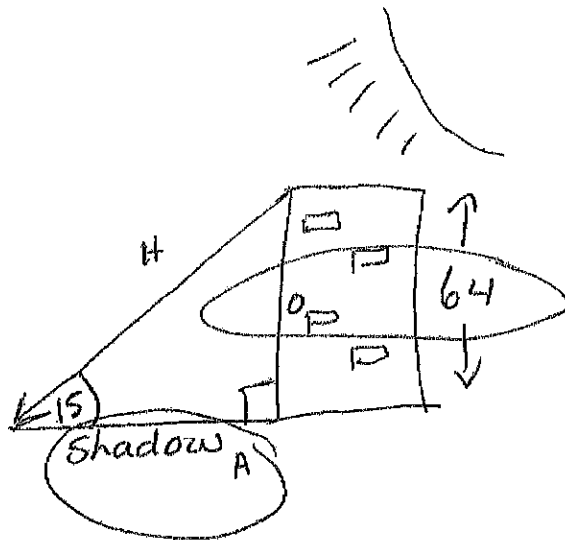
$V_{\text{whole}} = 9 \times 4 \times 6 = 216$

②  $\frac{30}{12} = x$   
 $V_{\text{missing piece}} = x \cdot 3 \cdot 4 \text{ or } 12x$   
 $30 = 12x$   
 $x = 2.5$

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

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

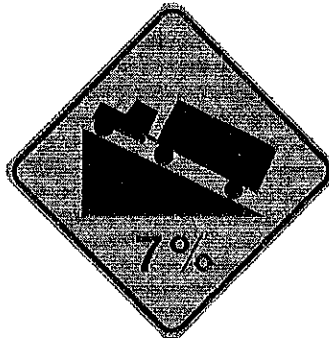


$$\tan \theta = \frac{O}{A}$$

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

$$x = \frac{64}{\tan 15} = 238.9$$

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?



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

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

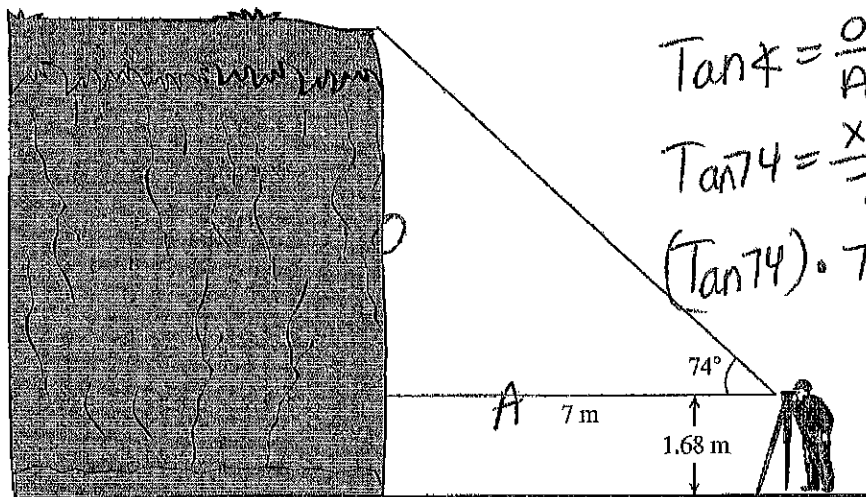
C.  $\tan^{-1}\left(\frac{7}{100}\right)$

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

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

or  $\tan^{-1}(7/100)$

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



$\tan \phi = \frac{O}{A}$

$\tan 74 = \frac{x}{7}$

$(\tan 74) \cdot 7 = x$

$x = 24.4$

$+ 1.68$

26.09

Calculate the height of the cliff.

A. 3.7 m

B. 8.4 m

C. 24.4 m

D. 26.1 m

**PART C: NUMERICAL-RESPONSE QUESTIONS**  
(calculator permitted)

Value: 6 marks

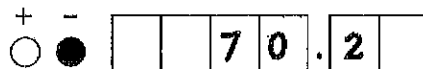
Suggested Time: 15 minutes

**INSTRUCTIONS:** When answering numerical-response questions on your Answer Sheet:

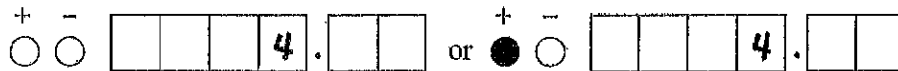
- print digits as illustrated:



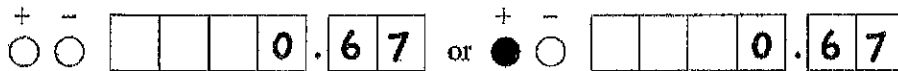
- shade the bubble with the negative symbol if the answer is negative; shade or leave blank the bubble with the positive symbol if the answer is positive.
- write your answer in the spaces provided using one digit per box, noting proper place value.
- leave unused boxes blank.
- For example,  $-70.2$  will be written as:



- For example, 4 will be written as:

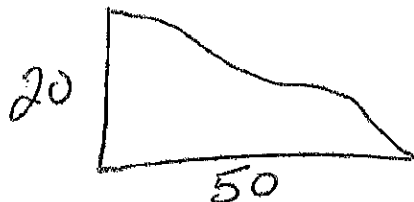


- For example,  $\frac{2}{3}$ , answered to two decimal places, will be written as:



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.



*rise*  
 $\frac{20}{50}$

*run*  
 or  $\frac{2}{5}$

$= 0.4$

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.

$$8 \times -\frac{2}{3} = \frac{w}{24}$$

$w = -16$

parallel - means they have the same slope!

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.

$$C(k) = 0.15k + 22$$

$$166 = 0.15k + 22$$

$$\begin{array}{r} 166 \\ -22 \\ \hline 144 \end{array} = \frac{0.15k}{0.15}$$

$k = 960$

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.

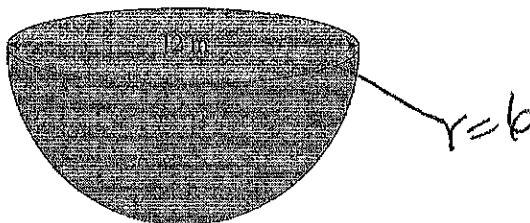
negative exponent  
Record your answer neatly on the Answer Sheet.

doubles - backwards 4 hrs

$$10\,000 (2)^{-4} = \boxed{625}$$

or 10000 now  
5000 1hr ago  
2500 2hr ago  
1250 3hr ago — 625 4hr ago

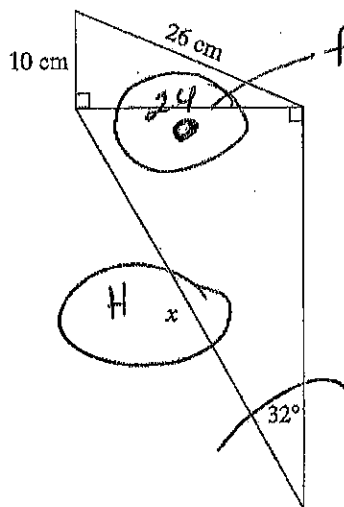
59. Calculate the surface area of the solid hemisphere below. Answer to the nearest square metre.



Record your answer neatly on the Answer Sheet.

$$\begin{aligned} \text{SA}_{\text{sphere}} &= 4\pi r^2 ; \therefore \frac{1}{2} \text{sphere} = \frac{4\pi r^2}{2} = 2\pi r^2 \\ &+ \text{circle on top} = \pi r^2 \\ &= 3\pi r^2 \\ &= 3\pi (6)^2 \\ &= 339.29 \\ &\text{or } \boxed{339 \text{ m}^2} \end{aligned}$$

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



find this 1st to find x

$$26^2 - 10^2 = 24^2$$

$$\sqrt{576} = \sqrt{24^2}$$

$$24 = 24$$

$$\sin \theta = \frac{o}{h}$$

$$\sin 32 = \frac{24}{x}$$

$$x = \frac{24}{\sin 32}$$

$$= 45.3 \text{ cm}$$

or 45 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"/>