BRITISH COLUMBIA
The Best Place on Earth

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 π 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.

Contents: 29 pages
54 multiple-choice questions (maximum of 54 marks)
6 numeric-response questions (maximum of 6 marks)

Examination: 2 hours
Additional Time Permitted: 60 minutes

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

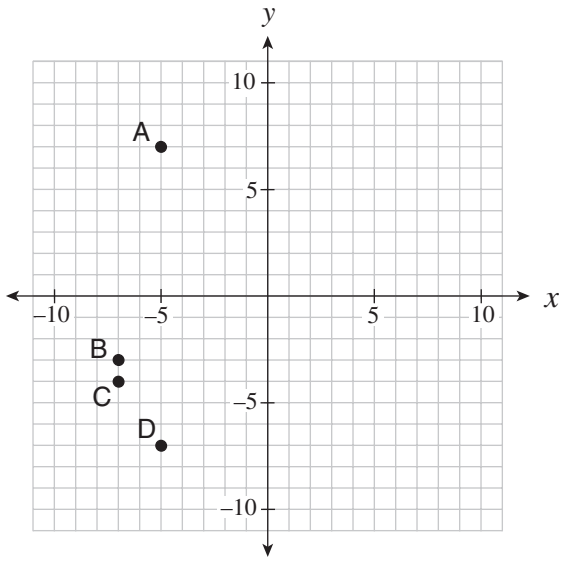
Suggested Time: 30 minutes
Value: 12 marks **Allowable Time: 40 minutes**

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
	○	●	○	○	○	○	○	○

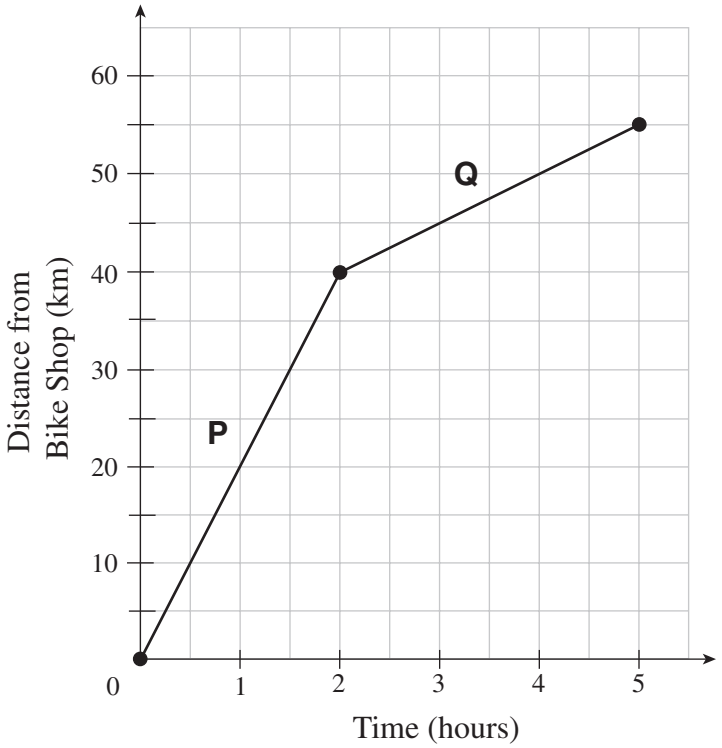
Use the following graph to answer question 1.



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

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

3. Solve the following system of equations:

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

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

4. 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

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

A. 2×3
B. $2^2 \times 3^3$
C. $2^3 \times 3^2$
D. $2^4 \times 3^3$

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

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

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

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

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

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

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

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

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

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

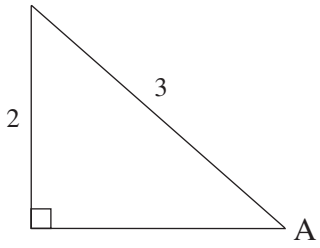
A. $4 \text{ yd} \times \frac{2.54 \text{ cm}}{1 \text{ in}}$

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

12. Determine the ratio of cos *A*.



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

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

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

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

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.

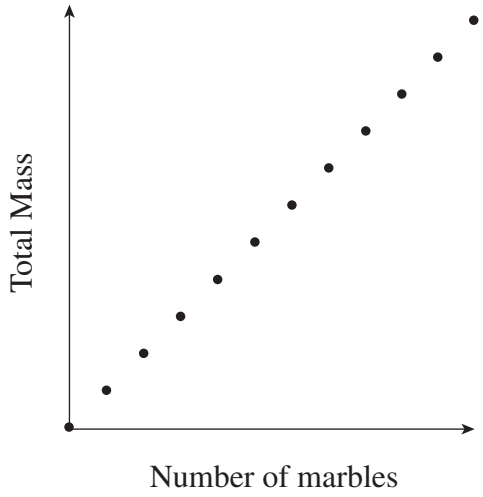
PART B: MULTIPLE-CHOICE QUESTIONS
(calculator permitted)

Value: 42 marks **Suggested Time: 75 minutes**

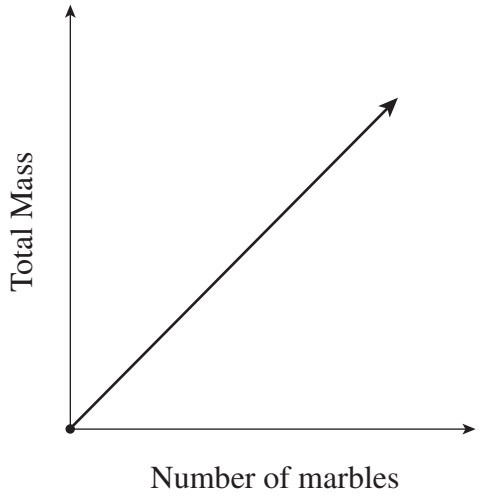
INSTRUCTIONS: For each question, select the **best** answer and record your choice on the **white Answer Sheet** provided. Using an HB pencil, completely fill in the bubble that has the letter corresponding to your answer.

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?

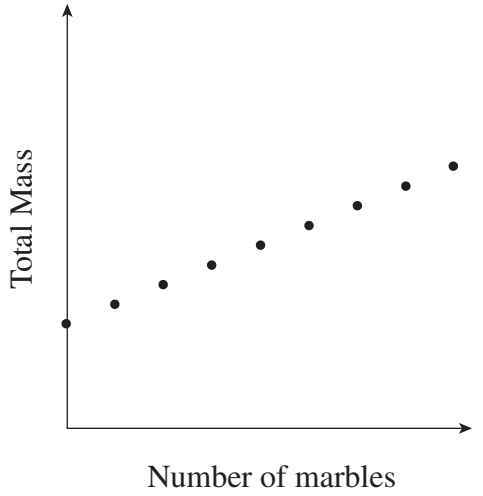
A.



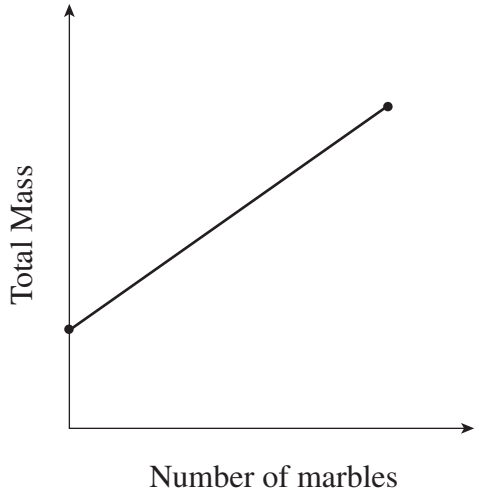
B.



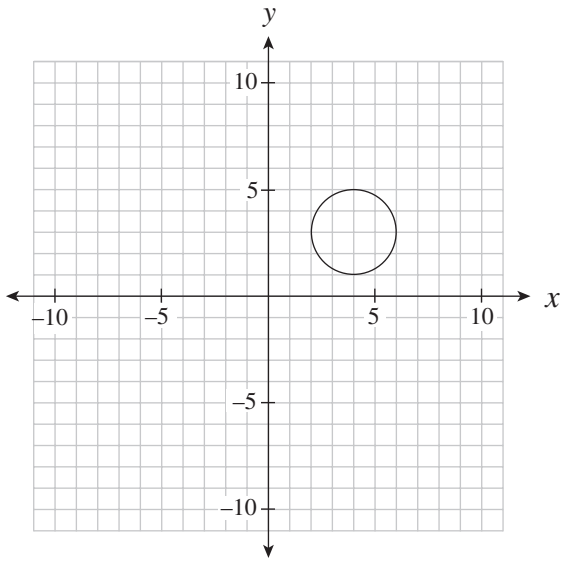
C.



D.



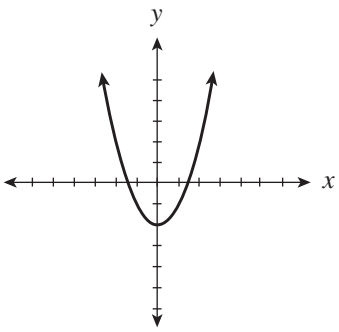
14. What is the range of the graph below?



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

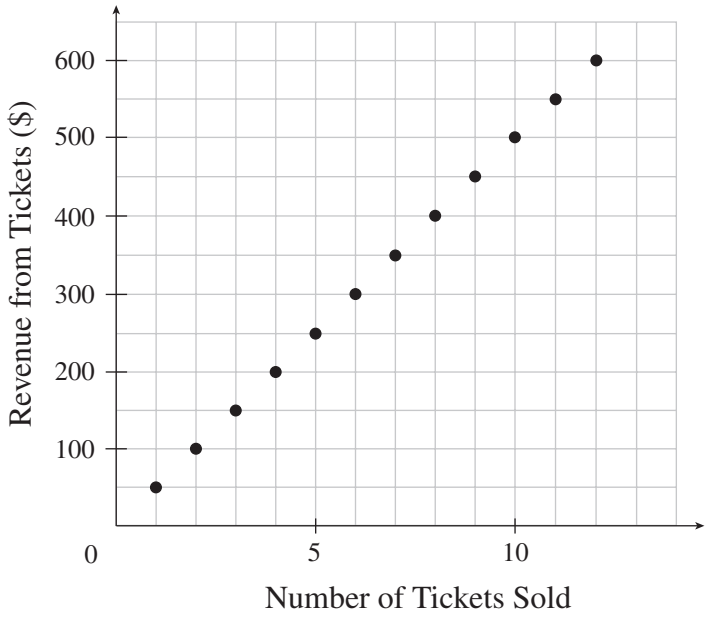
A. III only
B. IV only
C. I and II only
D. III and IV only

15. Which of the following relations are also functions?

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

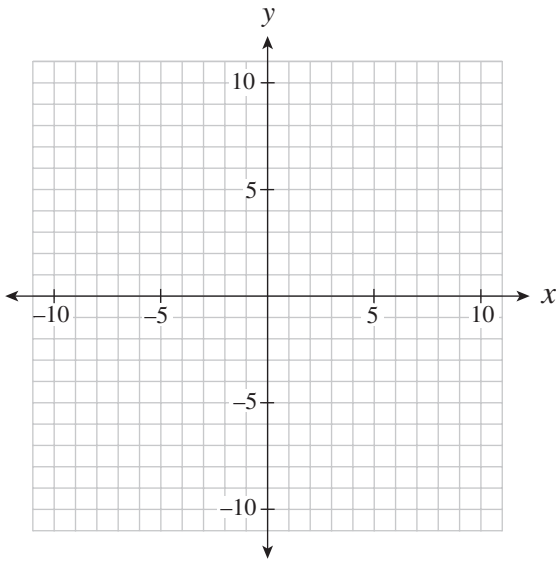
A. I only
B. I and IV only
C. II and III only
D. II, III and IV only

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

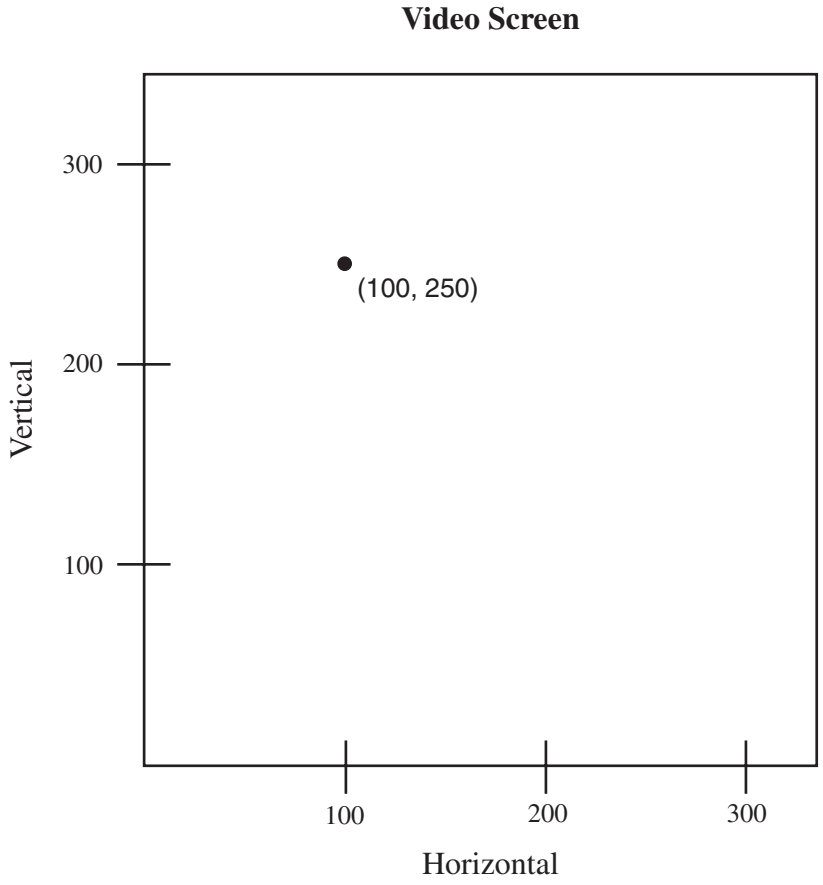
The grid below may be used for rough work to answer question 17.



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. $(9,\ 3)$

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?

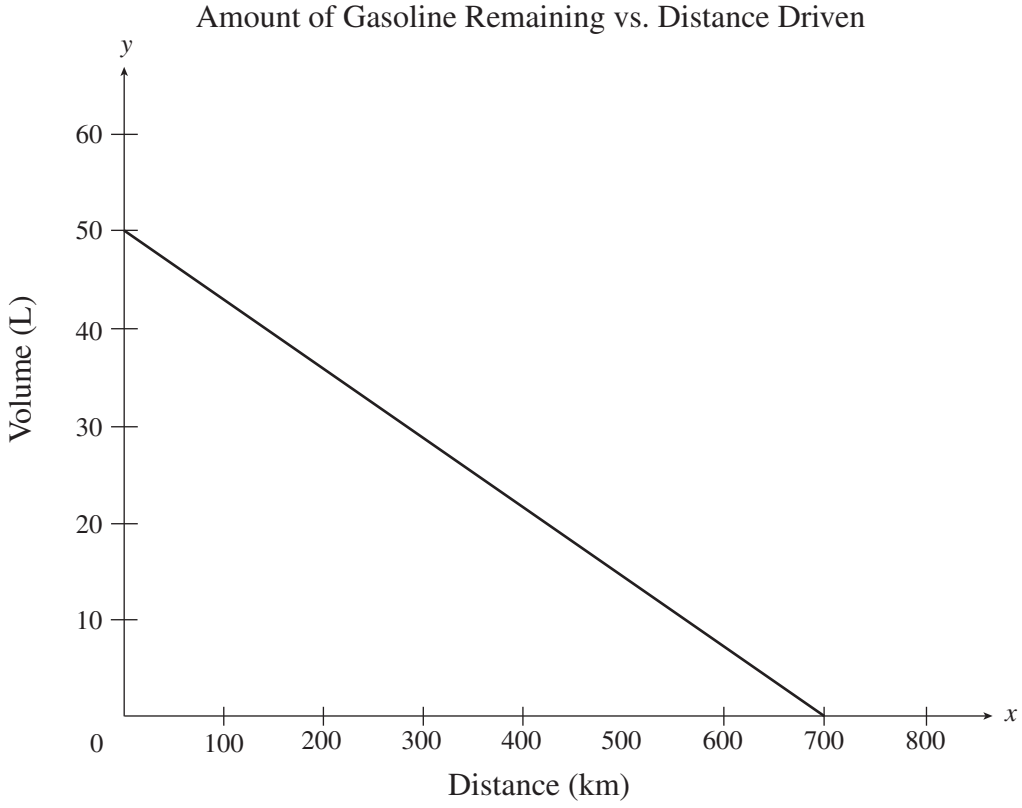


A. $(65,\ 78)$
B. $(65,\ 125)$
C. $(65,\ 208)$
D. $(65,\ 220.8)$

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.



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

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

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.	$y + 3 = 0$
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

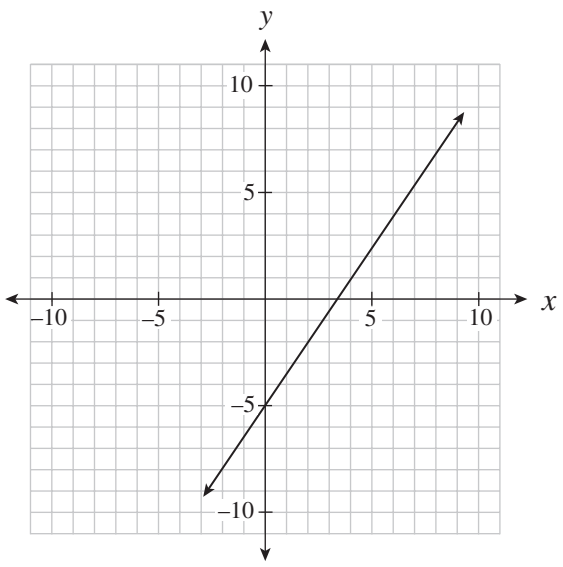
25. Which of the following statements are true for $2x + 3y = 6$?

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.

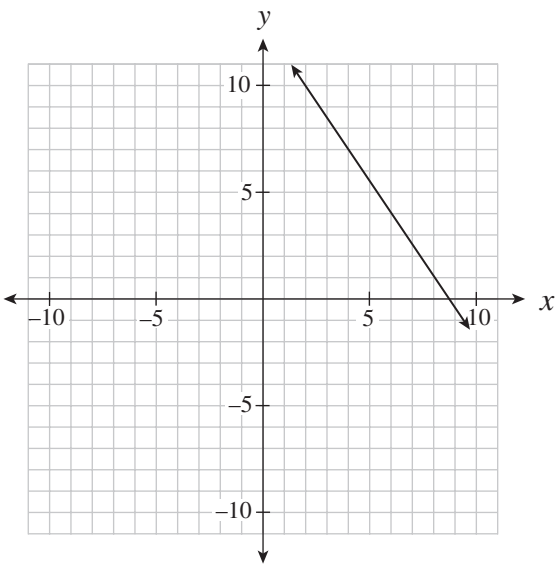
A. IV only
B. I and II only
C. I and IV only
D. III and IV only

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

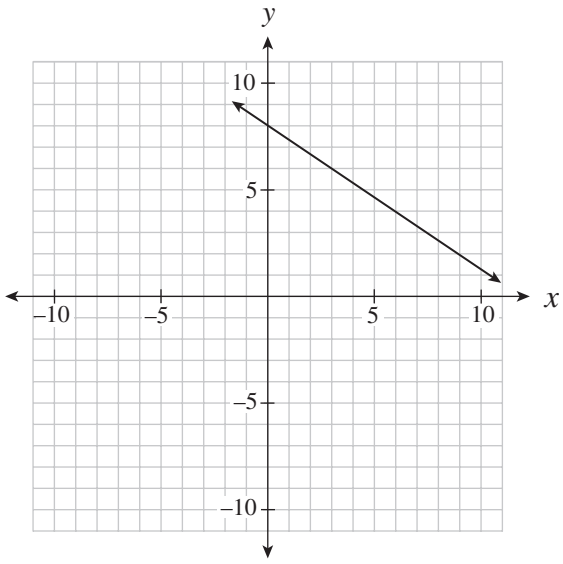
A.



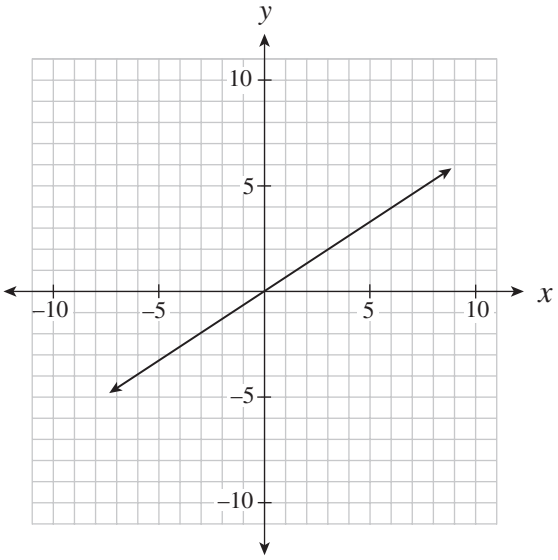
B.



C.



D.



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. $y = 3x + 15$

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. $y = 2x - 80$

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

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

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

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

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

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

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

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

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

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

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

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

A. $9a^6$

B. $27a^6$

C. $36a^8$

D. $108a^9$

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

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

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

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

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

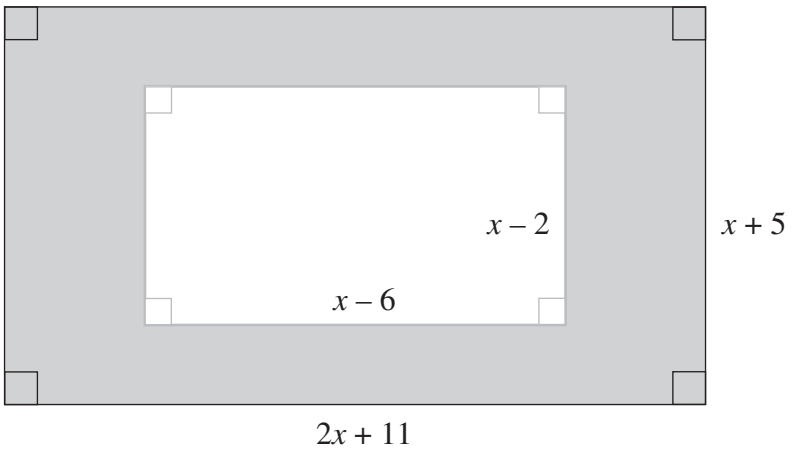
39. Pam expanded and simplified $(x-3)\left(x^2+2x-4\right)$, as shown below.

Steps	
I.	$x\left(x^2+2x-4\right)-3\left(x^2+2x-4\right)$
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. $3x^2 + 13x + 67$

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. $12x^5y^4$

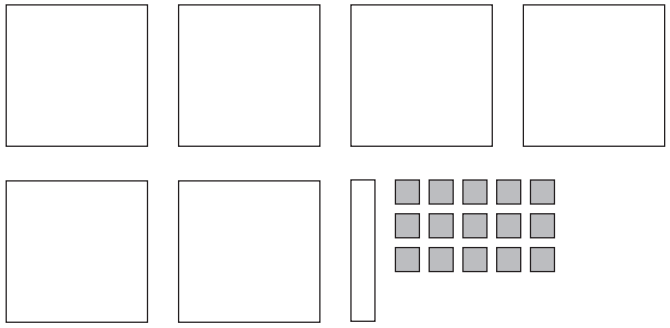
42. Which of the following expressions is a factor of $x^2 - 8x - 20$?

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

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

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

44. 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?

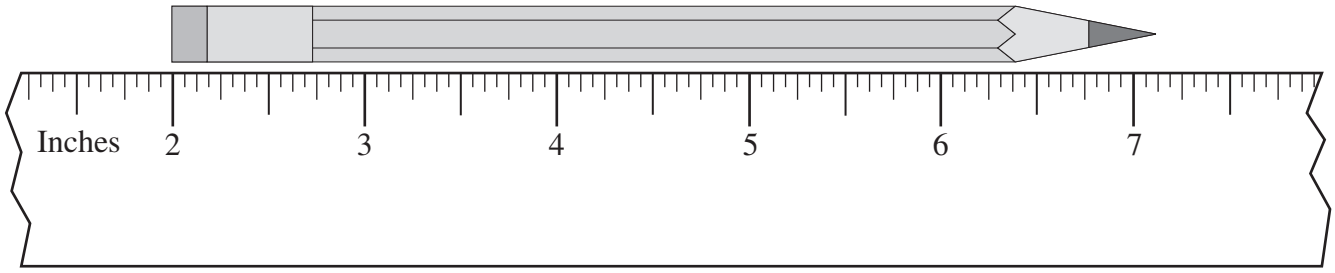
A. 8 each of  and 

B. 9 each of  and 

C. 10 each of  and 

D. 11 each of  and 

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

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

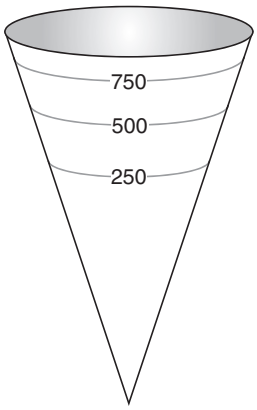
47. Which distance below is the longest?

0.6 mi, 1000 yd, 1 km, 900 m

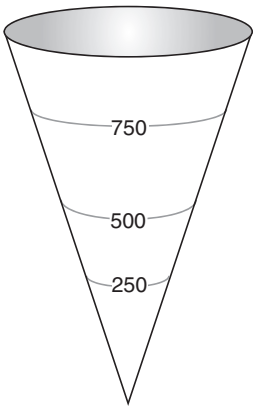
A. 0.6 mi
B. 1000 yd
C. 1 km
D. 900 m

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?

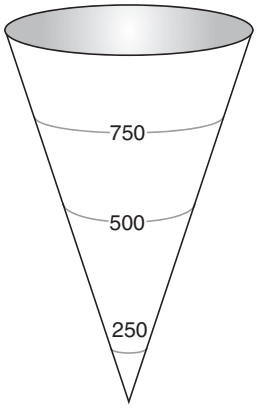
A.



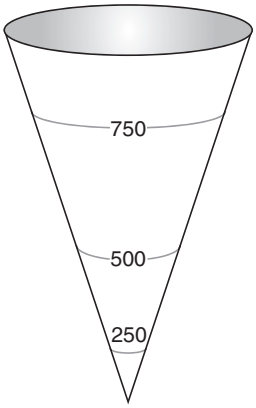
B.



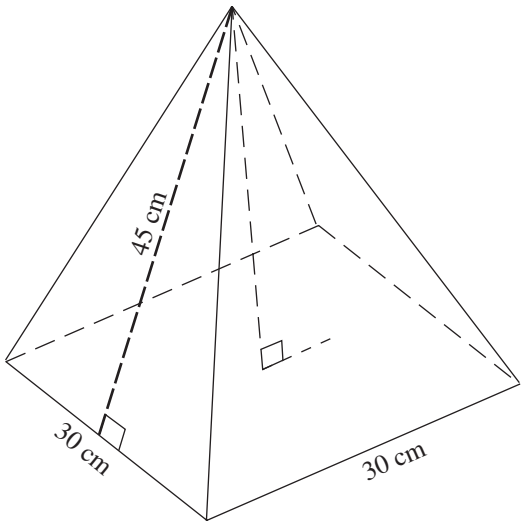
C.



D.



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



A. 10 062 cm^3

B. 12 728 cm^3

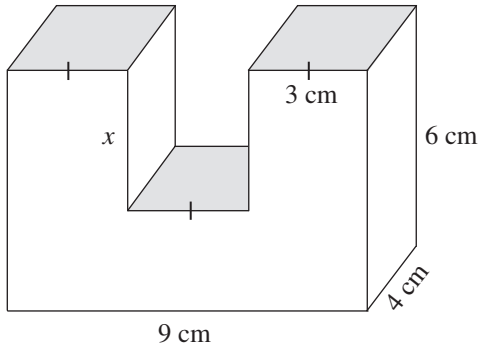
C. 13 500 cm^3

D. 40 500 cm^3

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

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

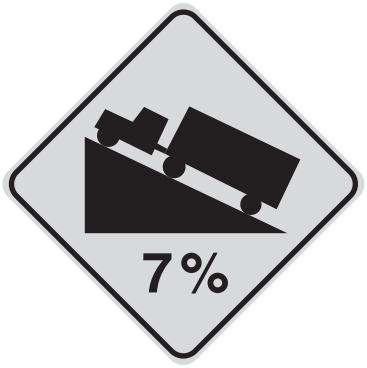


A. 3.1 cm
B. 2.5 cm
C. 1.75 cm
D. 1.25 cm

52. 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

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?



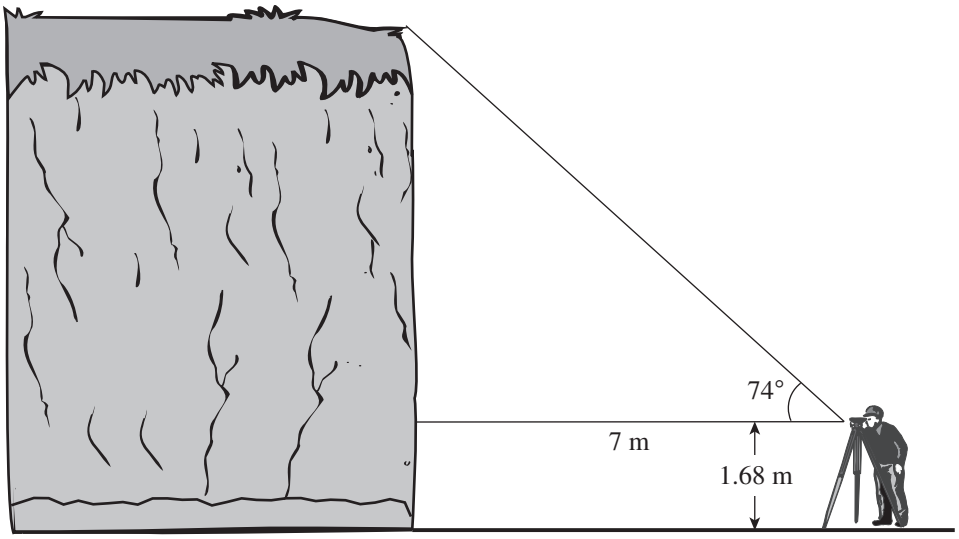
A. $\tan\left(\frac{7}{100}\right)$

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

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

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

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



Calculate the height of the cliff.

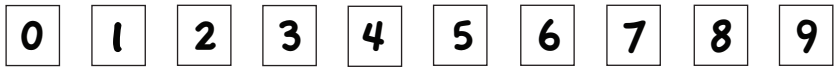
A. 3.7 m
B. 8.4 m
C. 24.4 m
D. 26.1 m

PART C: NUMERICAL-RESPONSE QUESTIONS
(calculator permitted)

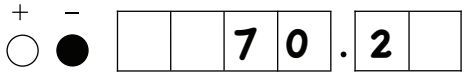
Value: 6 marks **Suggested Time: 15 minutes**

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

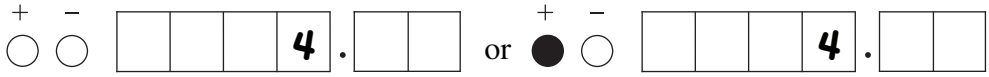
- print digits as illustrated:



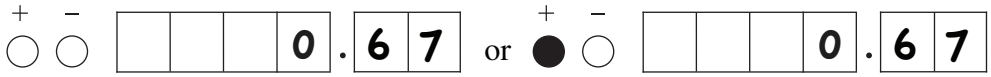
- shade the bubble with the negative symbol if the answer is negative; shade or leave blank the bubble with the positive symbol if the answer is positive.
- write your answer in the spaces provided using one digit per box, noting proper place value.
- leave unused boxes blank.
- For example, –70.2 will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

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

Record your answer neatly on the Answer Sheet.

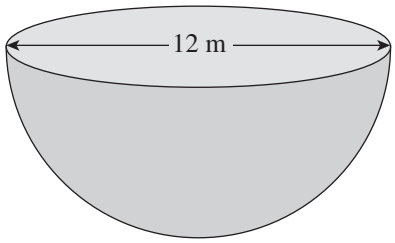
57. The cost C, in dollars, to rent a car is determined by the formula $C(k) = 0.15k + 22$, where k is the number of kilometres driven. Calculate the value of k if $C(k) = 166$. Answer to the nearest kilometre.

Record your answer neatly on the Answer Sheet.

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.

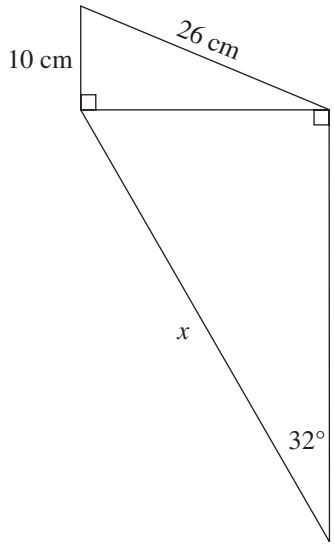
Record your answer neatly on the Answer Sheet.

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



Record your answer neatly on the Answer Sheet.

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



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
	○	●	○	○	○	○	○	○

Examination Rules

1. The time allotted for this examination is two hours.
   You may, however, take up to 60 minutes of additional time to finish.

2. Answers entered in the Examination Booklet will not be marked.

3. Cheating on an examination will result in a mark of zero. The Ministry of Education considers cheating to have occurred if students break any of the following rules:

   - Students must not be in possession of or have used any secure examination materials prior to the examination session.
   - Students must not communicate with other students during the examination.
   - Students must not give or receive assistance of any kind in answering an examination question during an examination, including allowing their papers to be viewed by others or copying answers from another student's paper.
   - Students must not possess any book, paper or item that might assist in writing an examination, including a dictionary or piece of electronic equipment, that is not specifically authorized for the examination by ministry policy.
   - Students must not copy, plagiarize or present as their own, work done by any other person.
   - Students must immediately follow the invigilator's order to stop writing at the end of the examination time and must not alter an Examination Booklet, Response Booklet or Answer Sheet after the invigilator has asked students to hand in examination papers.
   - Students must not remove any piece of the examination materials from the examination room, including work pages.

4. The use of inappropriate language or content may result in a mark of zero being awarded.

5. Upon completion of the examination, return all examination materials to the supervising invigilator.

UNIT CONVERSION

	Common Imperial	Imperial and SI	SI
Length	1 mile = 1760 yards 1 mile = 5280 feet 1 yard = 3 feet 1 yard = 36 inches 1 foot = 12 inches	1 mile ≈ 1.609 km 1 yard = 0.9144 m 1 foot = 30.48 cm 1 inch = 2.54 cm	1 km = 1000 m 1 m = 100 cm 1 cm = 10 mm
Mass (Weight)	1 ton = 2000 pounds 1 pound = 16 ounces	2.2 pounds ≈ 1 kg 1 pound ≈ 454 g 1 ounce ≈ 28.35 g	1 t = 1000 kg 1 kg = 1000 g
Common Abbreviations	mile = mi yard = yd feet = ' or ft inch = " or in ton = tn pound = lb ounce = oz		kilometre = km metre = m centimetre = cm millimetre = mm tonne (metric ton) = t gram = g

FORMULAE

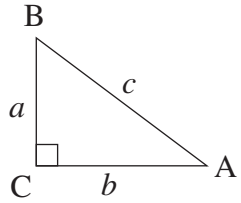
(Put your calculator in Degree Mode)

- Right triangles

$$\sin A = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\cos A = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\tan A = \frac{\text{opposite}}{\text{adjacent}}$$



Pythagorean Theorem

$$a^2 + b^2 = c^2$$

$$\text{distance} = \text{speed} \times \text{time}$$

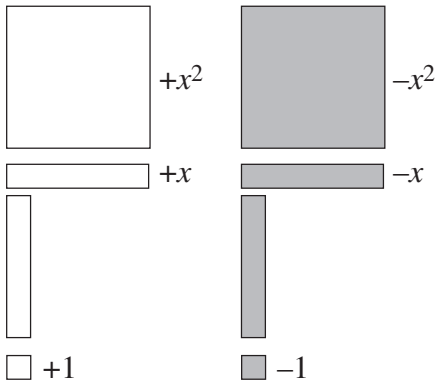
- The equation of a line:

$$y = mx + b$$
$$Ax + By + C = 0$$
$$y - y_1 = m(x - x_1)$$

- The slope of a line:

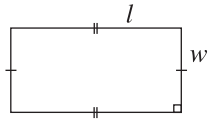
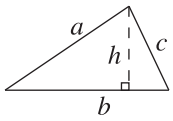
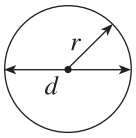
$$m = \frac{\text{rise}}{\text{run}} = \frac{\triangle y}{\triangle x} = \frac{y_2 - y_1}{x_2 - x_1}$$

Math Tiles Legend

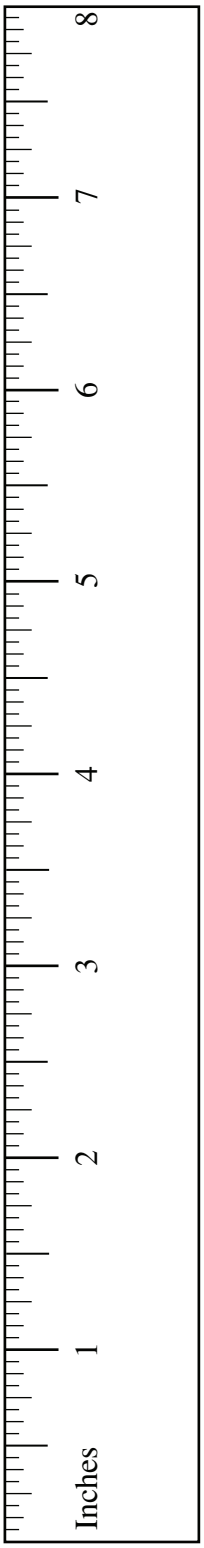


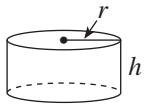
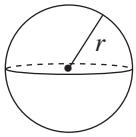
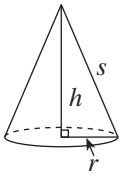
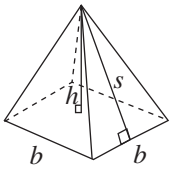
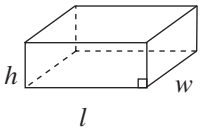
GEOMETRIC FORMULAE

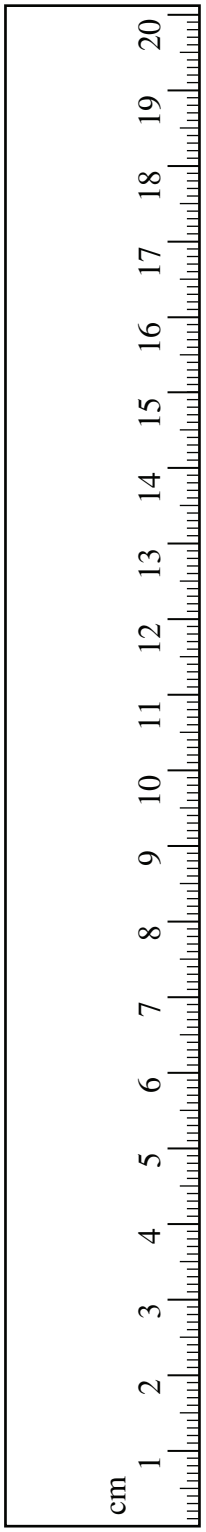
Key Legend	
l = length	P = perimeter
w = width	C = circumference
b = base	A = area
h = height	SA = surface area
s = slant height	V = volume
r = radius	
d = diameter	

Geometric Figure	Perimeter	Area
Rectangle 	$P = 2l + 2w$ **or** $P = 2(l + w)$	$A = lw$
Triangle 	$P = a + b + c$	$A = \frac{bh}{2}$
Circle 	$C = \pi d$ **or** $C = 2\pi r$	$A = \pi r^2$

NOTE: Use the value of π programmed in your calculator rather than the approximation of 3.14.



Geometric Solid	Surface Area	Volume
Cylinder 	$A_{top} = \pi r^2$ $A_{base} = \pi r^2$ $A_{side} = 2\pi rh$ $SA = 2\pi r^2 + 2\pi rh$	$V = (\text{area of base}) \times h$
Sphere 	$SA = 4\pi r^2$ **or** $SA = \pi d^2$	$V = \frac{4}{3}\pi r^3$
Cone 	$A_{side} = \pi rs$ $A_{base} = \pi r^2$ $SA = \pi r^2 + \pi rs$	$V = \frac{1}{3} \times (\text{area of base}) \times h$
Square-Based Pyramid 	$A_{triangle} = \frac{1}{2}bs$ (for each triangle) $A_{base} = b^2$ $SA = 2bs + b^2$	$V = \frac{1}{3} \times (\text{area of base}) \times h$
Rectangular Prism 	$SA = wh + wh + lw + lw + lh + lh$ **or** $SA = 2(wh + lw + lh)$	$V = (\text{area of base}) \times h$
General Right Prism	$SA =$ the sum of the areas of all the faces	$V = (\text{area of base}) \times h$
General Right Pyramid	$SA =$ the sum of the areas of all the faces	$V = \frac{1}{3} \times (\text{area of base}) \times h$



NOTE: Use the value of π programmed in your calculator rather than the approximation of 3.14.

ROUGH WORK SPACE

(No marks will be given for work done on this page.)