# MATH 10

# FINAL REVIEW

Name: _____

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# Chapter 1



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

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

Which statement below is true?

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

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

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

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

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

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

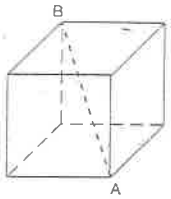
C. $4\text{ yd} \times \frac{3\text{ ft}}{1\text{ yd}} \times \frac{12\text{ in}}{1\text{ ft}} \times \frac{2.54\text{ cm}}{1\text{ in}}$

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

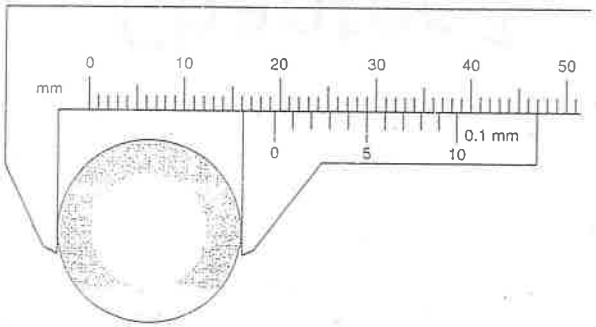
A. 0.3 km
B. 0.6 km
C. 1 km
D. 1.5 km

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




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

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




What is the diameter of the pipe?

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

CH. 1

(7) As an estimation strategy, what could be used to best approximate one centimetre?

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

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

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

How should the teacher mark these two solutions?

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

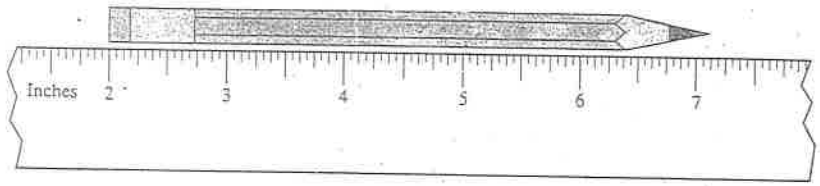
(9) A cylinder has a surface area of 402 $cm^2$. The height is three times greater than the radius. What is the height of the cylinder?

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

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

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

(11) Using the ruler below, determine the length of the pencil.




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

B. 5.2"

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

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

(12) 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

(13) Which distance below is the longest?

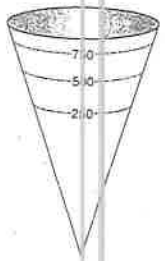
| 0.6 mi, 1000 yd, 1 km, 900 m |
|---|

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

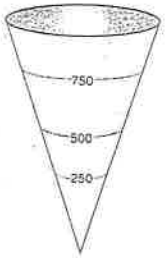
CH.1

(14) 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?

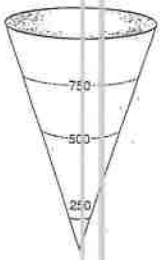
A.



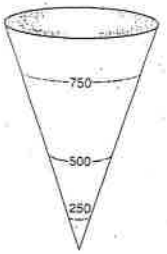

B.




C.



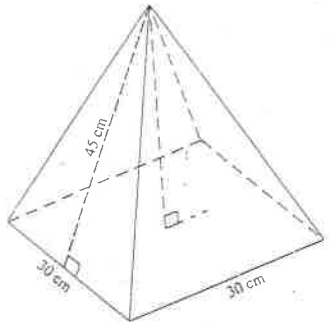

D.




(15) 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?

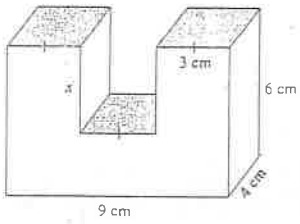
A. 0.57 cm
B. 0.83 cm
C. 5 cm
D. 6 cm

(16) 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 $cm^3$

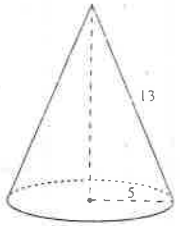
(17) The volume of the object below is 186 $cm^3$. Calculate the length of $x$.



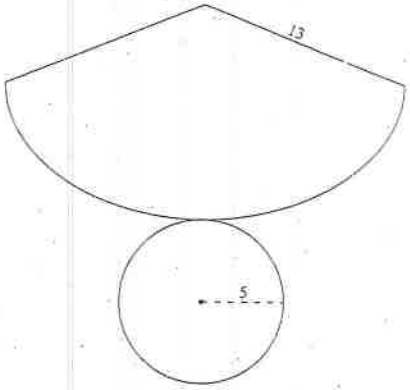

A. 3.1 cm
B. 2.5 cm
C. 1.75 cm
D. 1.25 cm

CH.1

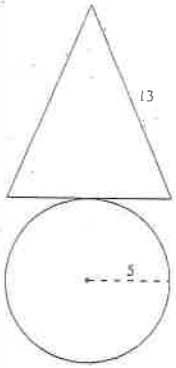
(18) Which of the following net diagrams best constructs the cone below?



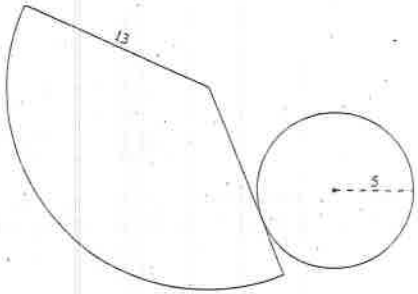

A.



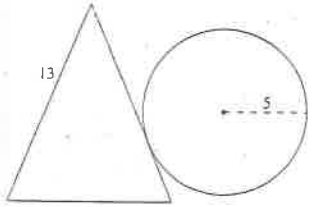

B.



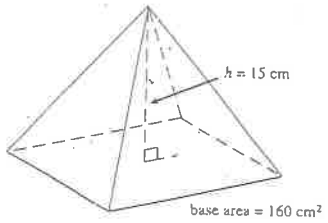

C.



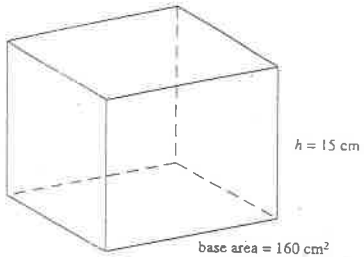

D.



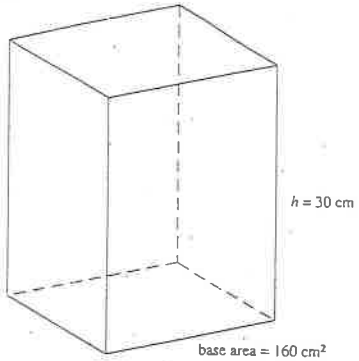
(19) Which of the following shapes has a volume three times larger than the pyramid below?



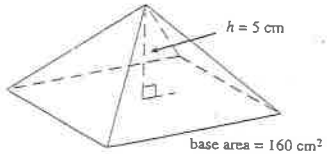

A.



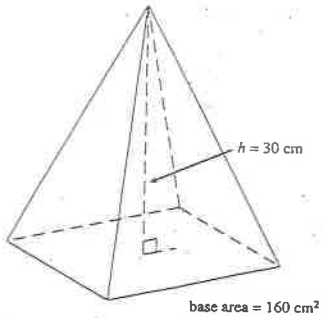

B.




C.




D.

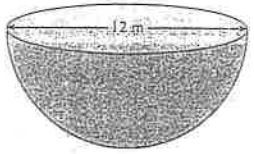





## Numerical Response

(20) Convert 150 pounds into kilograms. Answer to the nearest kilogram.

(21) Calculate the surface area of the solid hemisphere below. Answer to the nearest square metre.



# CHAPTER 1
## Answer Key

1. D
2. C
3. C
4. A

5. C
6. C
7. C
8. C
9. C
10. C
11. A
12. A
13. C
14. A
15. B
16. B
17. B
18. A
19. A

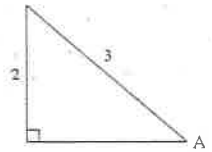
### Numerical Response

20. 68 kg
21. 339 $m^2$

# Chapter 2



(1) Determine the ratio of cos $A$.



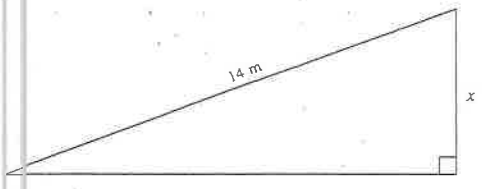

A. $\cos A = \frac{2}{3}$

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

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

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

(2) Using a protractor, measure one of the unknown angles and determine the length of side $x$.

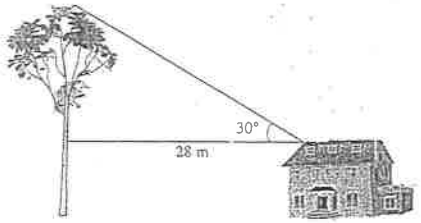



**Note: This diagram is drawn to scale.**

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

CH.2

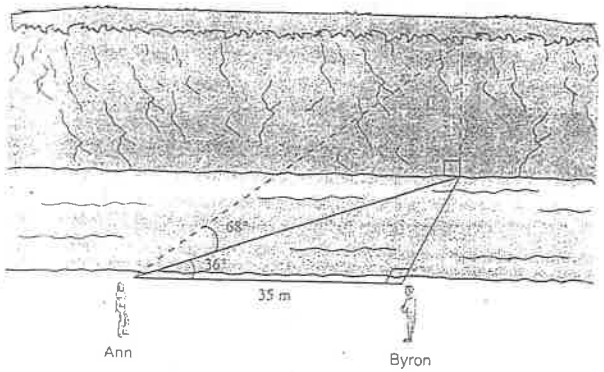
(3) A 10 metre tall farmhouse is located 28.0 m away from a tree with an eagle's nest. The angle of elevation from the roof of the farmhouse to the eagle's nest is 30°.




What is the height of the eagle's nest?

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

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




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

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

(5) In $\Delta ABC$, $\angle C = 90°$, $AB = 17$ cm and $AC = 15$ cm. Calculate the measure of $\angle ABC$.

A. 28°
B. 41°
C. 49°
D. 62°

(6) 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

(7) 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?

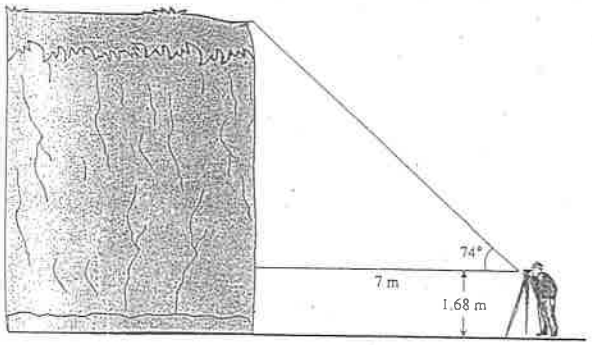

A. $\tan\left(\frac{7}{100}\right)$

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

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

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

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



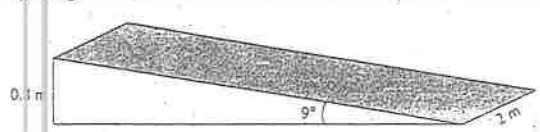

Calculate the height of the cliff.

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



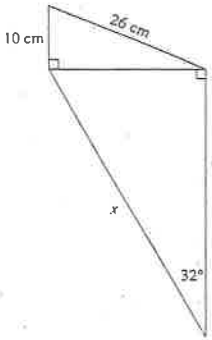
## Numerical Response

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




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

(10) Calculate the length of side $x$ on the diagram below. Answer to the nearest centimetre.



# CHAPTER 2
## Answer Key

1. B

2. B
3. C
4. D
5. D
6. C
7. C
8. D

Numerical Response

9. $10.2 m^2$
10. 45cm

# Chapter 3



① Which of the following statements are true?

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

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

② 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. $2^4 \times 3^3$

③ What is the greatest common factor of 12, 24, 30, 72?

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

CH.3

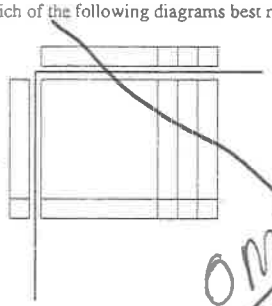
(4) Which two numbers have the following properties?

- Their GCF is 12.
- Their LCM is 72.

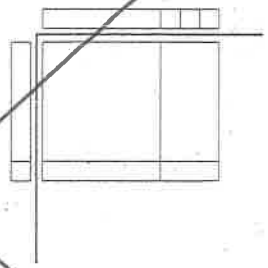
A. 2 and 3
B. 24 and 36
C. 48 and 72
D. 72 and 864

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

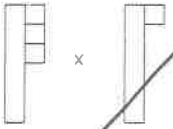
A.



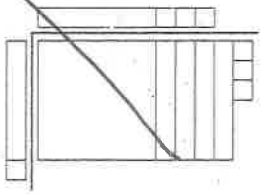
B.



C.



D.



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

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

(7) Which of the following expressions have a factor of $x+2$?

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

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

(8) Factor: $y^2-81$

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

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

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

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

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

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


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

(12) 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.

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

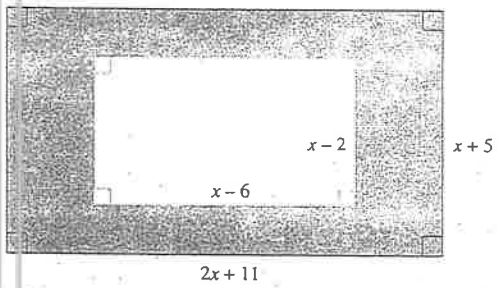
A. $x-2$
B. $x-4$
C. $x-5$
D. $x-10$

CH.3

(14) 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. $12x^5y^4$

(15) Determine an expression to represent the shaded area below.

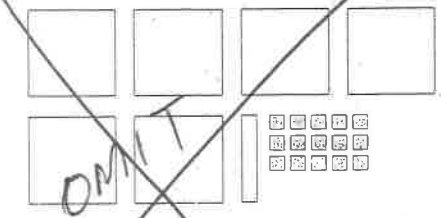



A. $x^2+43$
B. $x^2+13x+67$
C. $x^2+29x+43$
D. $3x^2+13x+67$

(16) When completely factored, how many factors does $2x^4-24x^2-128$ have?

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

(17) 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 ▭

Numerical Response

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

# CHAPTER 3
## Answer Key

1. C
2. C
3. C

4. B
~~5. A~~
6. A
7. D
8. C
9. A
10. D
11. A
12. B
13. D
14. B
15. C
16. C
~~17. B~~

Numerical Response

18. 9

# Chapter 4



(1) Which of the following statements are true?

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

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

(2) Simplify: $\sqrt{72}$

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

(3) Evaluate: $16^{-\frac{3}{4}}$

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

(4) Express $2\sqrt{5}$ as an entire radical.

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

CH.4

(5) 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

(6) Simplify: $\left(2x^3\right)^3 \cdot 3x^4$

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

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

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

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

A. $\frac{x^{3a-9}}{125}$
B. $\frac{x^{a-3}}{5}$
C. $125x^{3a-9}$
D. $\frac{x^{27a}}{5}$

(9) Which pattern could be used to predict $3^{-4}$?

A.

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

B.

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

C.

| | |
|---|---|
| $3^3$ | 27 |
| $3^2$ | 9 |
| $3^1$ | 3 |
| $3^0$ | 1 |
| $3^{-1}$ | $-3$ |
| $3^{-2}$ | $-9$ |
| $3^{-3}$ | $-27$ |

D.

| | |
|---|---|
| $3^3$ | 9 |
| $3^2$ | 6 |
| $3^1$ | 3 |
| $3^0$ | 0 |
| $3^{-1}$ | $-3$ |
| $3^{-2}$ | $-6$ |
| $3^{-3}$ | $-9$ |

(10) Which of the following number lines best represents the placement of X, Y, Z, given:

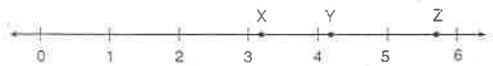
$X = 2\sqrt{5}$

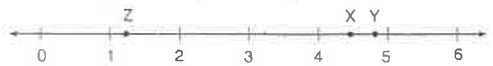
Y = cube root of 68

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

A. 


B. 


C. 


D. 


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

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

Which step contains her first mistake?

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



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

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

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

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

(13) Which one of the following sets of numbers contains only rational numbers?

A. $\left\{-\frac{3}{4}, 7.1, \sqrt{15}\right\}$

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

C. $\{-3, 4.\overline{23}, 4.21314\ldots\}$

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

(14) Simplify: $\sqrt{x^3} \div \sqrt[3]{x^4}$

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

(15) Simplify: $\sqrt[3]{1080}$

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

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

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

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

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

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

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

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

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

Numerical Response

(17) 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.

# CHAPTER 4
## Answer Key

1. A
2. B
3. B
4. B
5. C
6. B
7. B
8. A
9. A
10. A
11. C
12. B
13. A
14. A
15. C
16. A

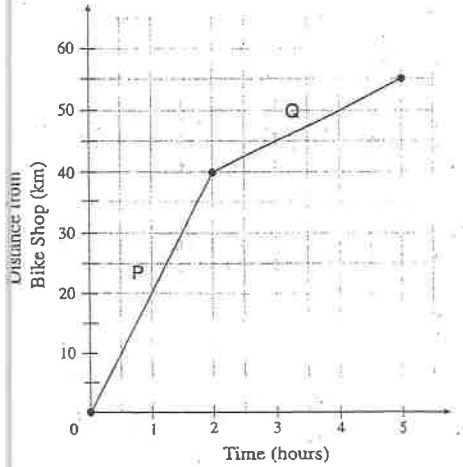
Numerical Response

17. 625

# Chapter 5



(1) 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.

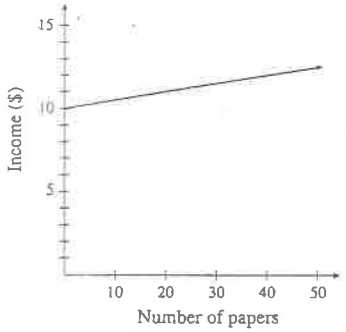
A. decreased by 15 km/h
B. decreased by 5 km/h
C. increased by 15 km/h
D. increased by 11 km/h

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

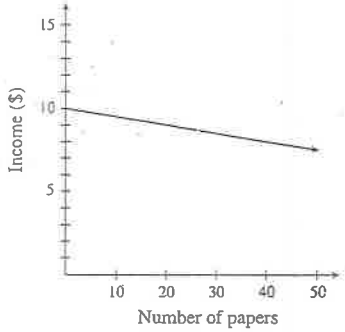
A. $108
B. $500
C. $780
D. $970

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

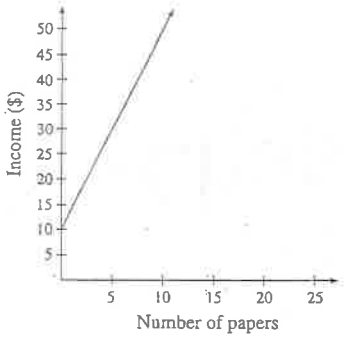
A.



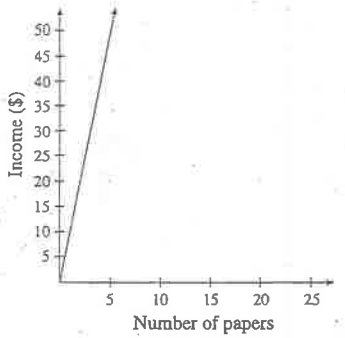

B.




C.



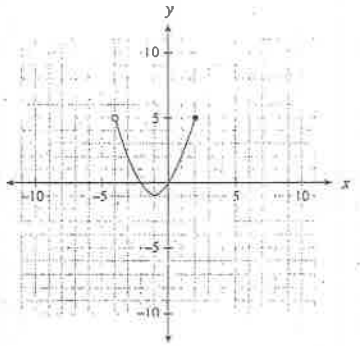

D.




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

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

(5) Determine the domain of the relation graphed below.




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

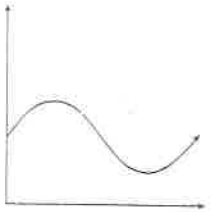
(6) Which of the following coordinates are intercepts of the linear relation $2x - 3y + 30 = 0$?

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

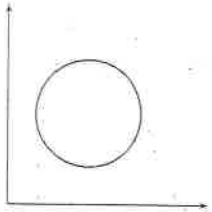
A. I only
B. I and IV only
C. II and III only
D. II and IV only

(7) Which of the following relations are also functions?

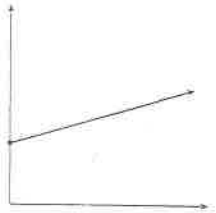
I.



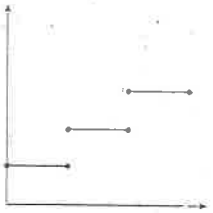
II.



III.



IV.



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

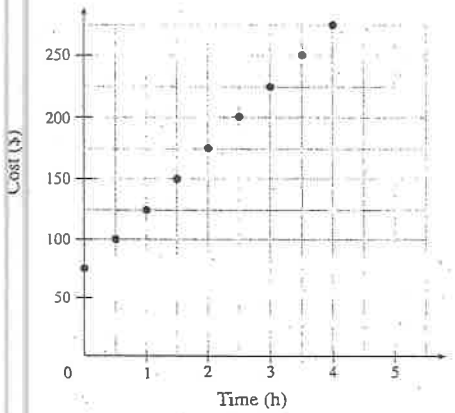
(8) The cost to insure jewellery is a fixed amount plus a percentage of the value of the jewellery. It costs $32 to insure $1000 worth of jewellery or $44.50 to insure $3500 worth of jewellery. What is the fixed amount to insure jewellery?

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

CH.5

use for #9

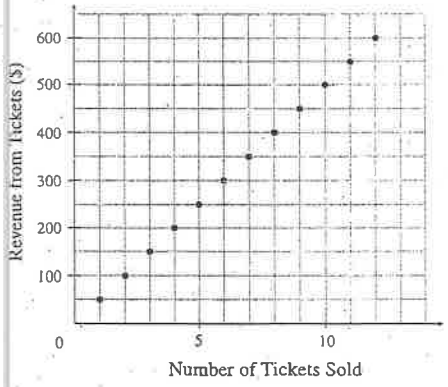
Cost of Hiring an Electrician vs. Time




(9) What is the cost of hiring an electrician for 8 hours?

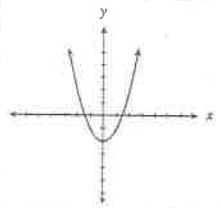
A. $550
B. $475
C. $400
D. $275

(10) 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

(11) 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

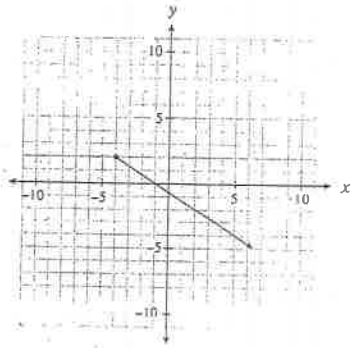
(12) Damien has a list of 37 potential customers for his house-painting business. In order to get a business grant, he must graph his income versus the number of customers. Determine the domain of the graph.

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

(13) 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. $y = 2x - 80$

(14) Determine the range of the linear relation graphed below.



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

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

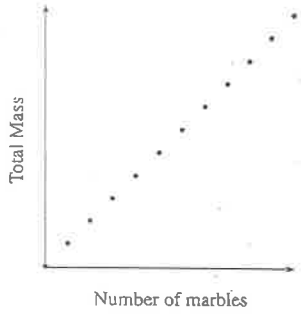
A. $(-5, 3)$
B. $(-3, 5)$
C. $(3, -5)$
D. $(5, -3)$

(16) Which of the following scenarios is **not** linear?

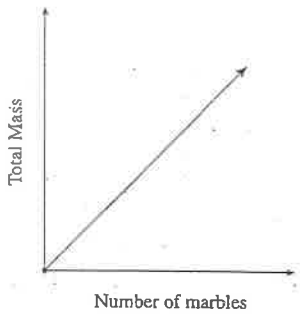
A. the height of a football thrown over time
B. the total weight of a jar of pennies as more pennies are added
C. the distance travelled by a car moving at a constant speed over time
D. the pay of a truck driver who earns $2500 a month, plus $0.50 for every kilometre he drives

(17) 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?

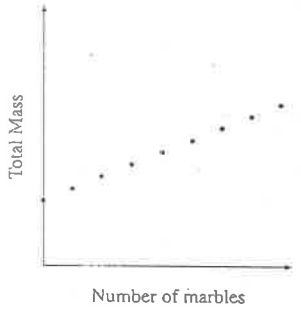
A.



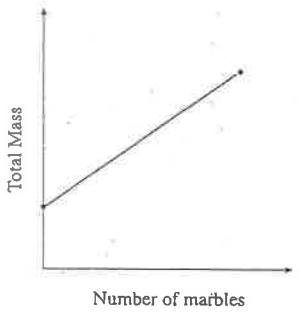

B.




C.

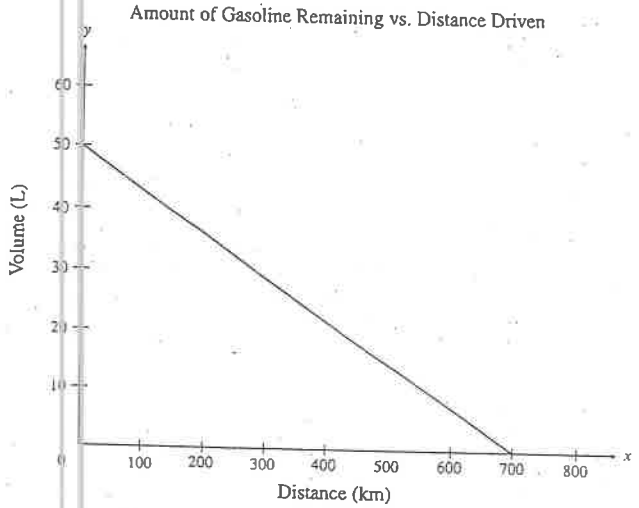



D.






Amount of Gasoline Remaining vs. Distance Driven

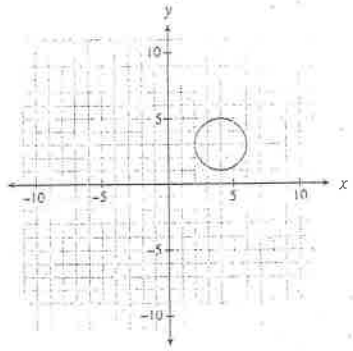



(18) The graph above shows the relationship between the amount of gasoline remaining in a 50 L tank and the distance driven for a certain car.

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

(19) What is the range of the graph below?



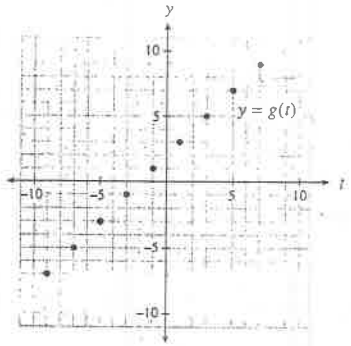

| | |
|---|---|
| I. | All $x$ values between 2 and 6 inclusive. |
| II. | $(2, 6)$ |
| III. | $[1, 5]$ |
| IV. | $1 \leq y \leq 5$ |

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

CH.5

## Numerical Response

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




(21) 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.

# CHAPTER 5
## Answer Key

1. A
2. C

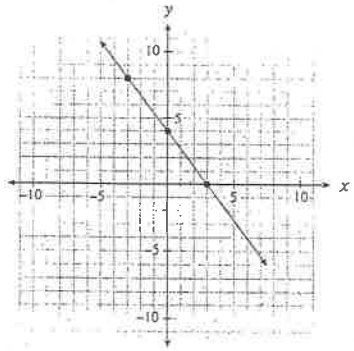
3. A
4. D
5. A
6. B
7. B
8. A
9. B
10. A
11. D
12. B
13. D
14. B
15. C
16. A
17. C
18. C
19. D

Numerical Response

20. -5
21. 960km

# Chapter 6






① Which of the following equations describes the linear relation graphed above?

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

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

② Determine the equation of a line, in slope-intercept form, that passes through the points $(6, 1)$ and $(-10, 9)$.

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

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

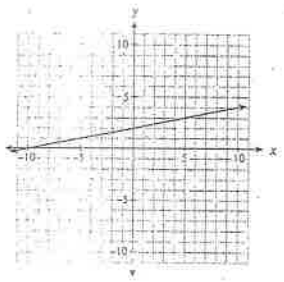
C. $y=-2x+8$

D. $y=-2x+13$

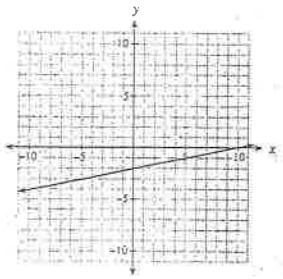
CH.6

(3) Which graph represents the relation $x - 5y + 10 = 0$?

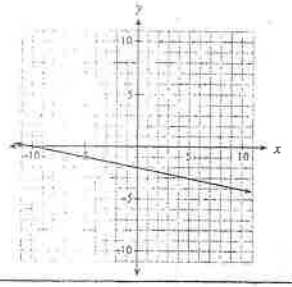
A.



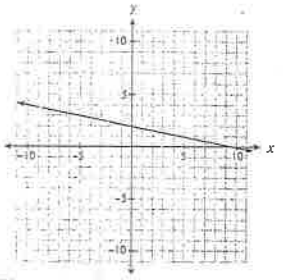
B.

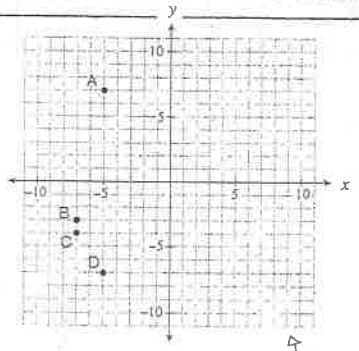


C.



D.

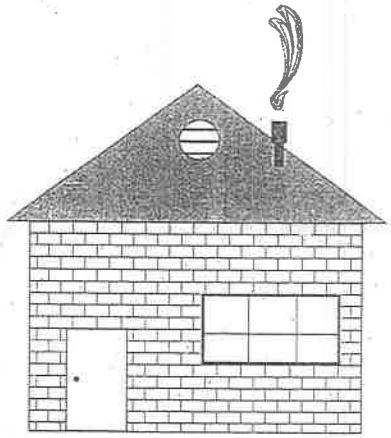





(4) The line $y - 2 = \frac{1}{2}(x - 5)$ passes through which point on the graph?

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

(5) Use a ruler to determine the slope of the roof shown below.



**Note: This diagram is drawn to scale.**

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

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

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

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

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

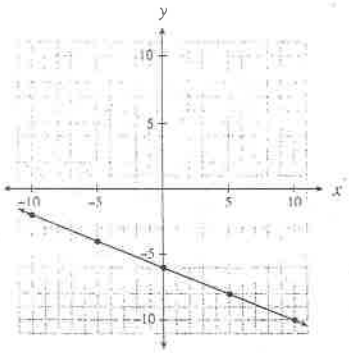
A. $-2$

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

C. $2$

D. $10$

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

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

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

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

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

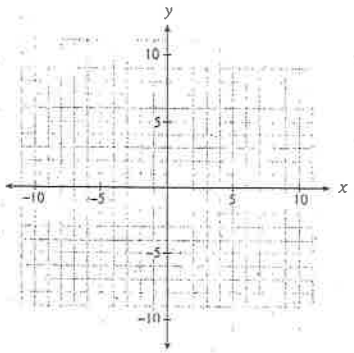
B. $\frac{3}{5}$

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

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

CH.6

use for #9



(9) 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. $(9, 3)$

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

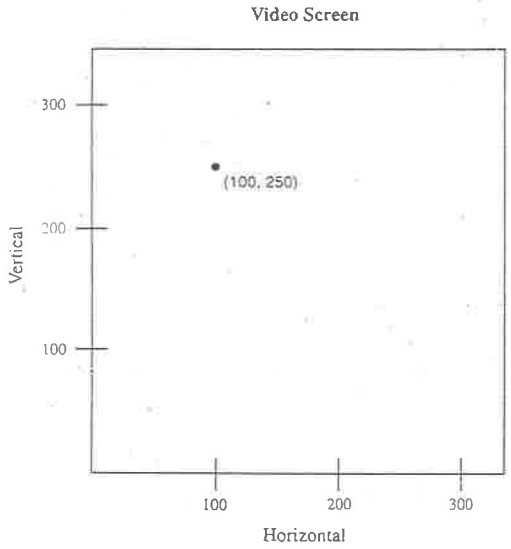
| | Steps |
|---|---|
| I. | Place a dot on the $y$-axis at positive 7. |
| II. | Move up two on the $y$-axis to positive 9. |
| III. | From the positive 9, move to the left three spots and place a dot there. |
| IV. | Draw a line through the two dots. |

Where did Kelly make the first mistake in her explanation?

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

CH.6

(11) 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?



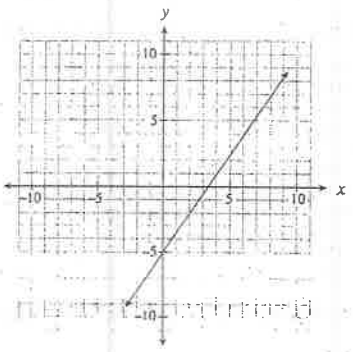

A. $(65, 78)$
B. $(65, 125)$
C. $(65, 208)$
D. $(65, 220.8)$

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

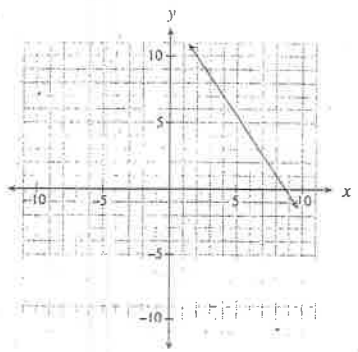
A. $(1, 0)$
B. $(0, 1)$
C. $(0, -2)$
D. $(-2, 0)$

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

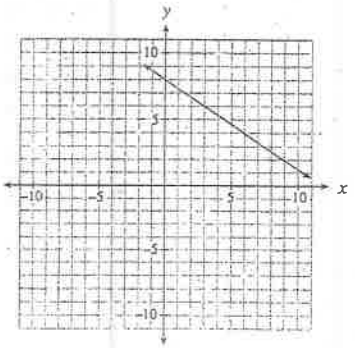
A.



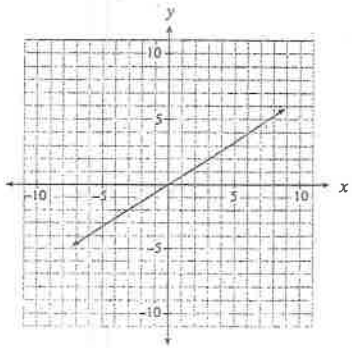

B.




C.




D.




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

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

(15) 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. $5x - 5y - 30 = 0$

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

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

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

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

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

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

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

(18) 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. $A > 0,\ B < 0,\ C < 0$

CH.6

(19) 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

(20) 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 $y = \frac{2}{3}x + 2$. |
| V. | The range is all real numbers. |

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

(21) 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. $y = 3x + 15$

CH 6

(22) 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

Numerical Response

(23) 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.

(24) 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.

# CHAPTER 6
## Answer Key

1. D
2. A
3. A
4. C

5. B
6. A
7. C
8. C
9. A
10. D
11. C
12. D
13. A
14. C
15. C
16. A
17. D
18. B
19. D
20. A
21. A
22. C

Numerical Response

23. -16
24. 0.4

# Chapter 7



(1) Solve for $y$ in the following system of equations:

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

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

(2) Solve the following system of equations:

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

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

(3) 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

CH.7

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

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

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

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

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

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

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

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

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

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

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

(6) 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. $12x + y = 8$
$x + 18y = 108$

(7) 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

CH.7

## Numerical Response

(8) Solve for $x$:

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

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

# CHAPTER 7
## Answer Key

1. B
2. C
3. A

4. D
5. A
6. A
7. A

Numerical Response

8. -4
9. 0.5 pounds

# SECTION 2

# OF REVIEW

SECTION 2

OF REVIEW

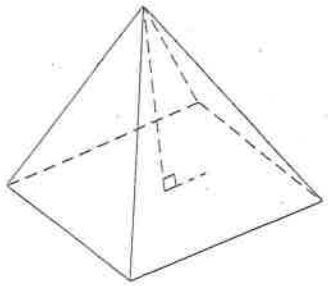
# PART 1 - MEASUREMENT

## PART A: MULTIPLE-CHOICE QUESTIONS

1. Which of the following examples is the best referent for one millimetre?

   A. diameter of a penny
   B. thickness of a fingernail
   C. length of a five-dollar bill
   D. distance from the floor to a door knob

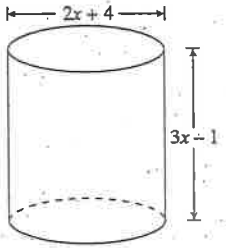
2. Which expression could be used to calculate the surface area of the right square-based pyramid with a base length of 10 cm and a height of 12 cm?



   A. $SA = 2(10)(12)+(10)^2$
   B. $SA = 2(10)(12)+(12)^2$
   C. $SA = 2(10)(13)+(10)^2$
   D. $SA = 2(10)(13)+(13)^2$

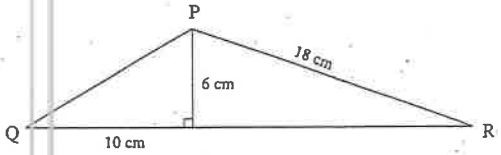


3. Which of the following expressions represents the volume of the cylinder below?



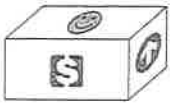

   A. $V = \pi(6x^2+10x-4)$
   B. $V = \pi(3x^3-x^2+12x-4)$
   C. $V = \pi(3x^3+11x^2+8x-4)$
   D. $V = \pi(12x^3+32x-16)$

4. Determine the measure of $\angle QPR$.

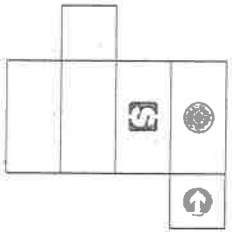



   A. 59°
   B. 71°
   C. 102°
   D. 130°

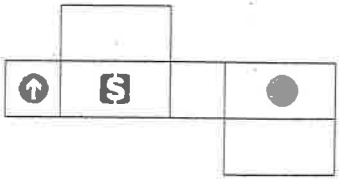
5. Which net diagram represents the prism below?



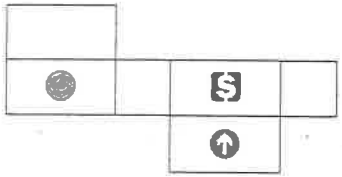
A.



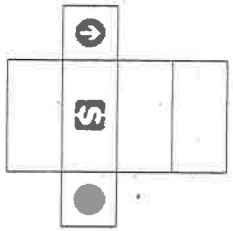
B.



C.



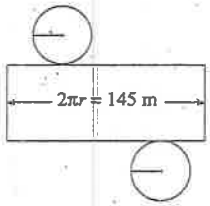
D.



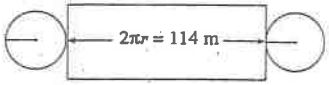


6. Raj was asked to make a cylindrical tank with a lateral surface area of 2622 $m^2$ and a height of 23 m. Which net diagram below would be correct for this cylinder?

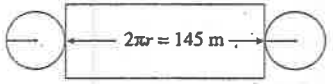
A.



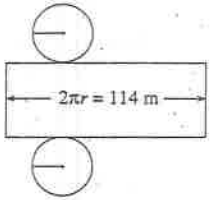

B.



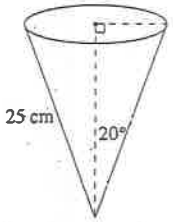

C.




D.

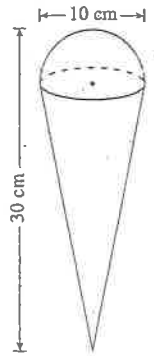



7. Calculate the volume of the right cone below.



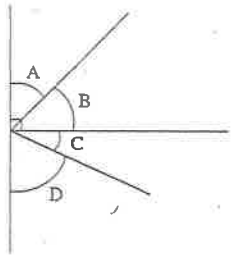

A. 210 $cm^3$
B. 1799 $cm^3$
C. 1914 $cm^3$
D. 2168 $cm^3$

8. Determine the surface area of the solid below.




A. 481 $cm^2$
B. 558 $cm^2$
C. 1414 $cm^2$
D. 2199 $cm^2$

9. Which of the following angles is an angle of depression?



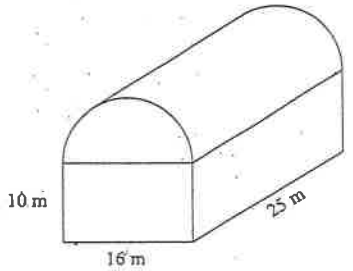

A. A
B. B
C. C
D. D



10. A cat on the ground is 50 m away from the base of a pole. An osprey's nest is on the top of the pole, which is 20 m tall. What is the measure of the angle of inclination from the cat to the osprey's nest?

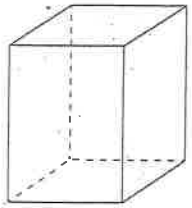
A. 22°
B. 24°
C. 66°
D. 68°

11. Calculate the volume of the shape below.




A. 6 513 $m^3$
B. 9 027 $m^3$
C. 14 053 $m^3$
D. 24 106 $m^3$

12. A wooden block is a square-based prism, as shown below:



Given the base area is 50 $cm^2$ and the height is 12 cm, what is its surface area?

A. 339 $cm^2$

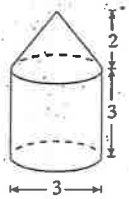
B. 439 $cm^2$

C. 600 $cm^2$

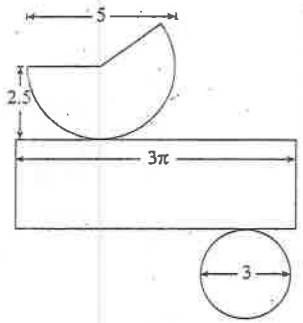
D. 1300 $cm^2$



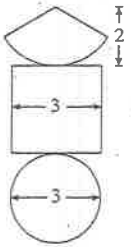
13. Which of the following net diagrams represents the figure below? Note: all diagrams drawn to scale.



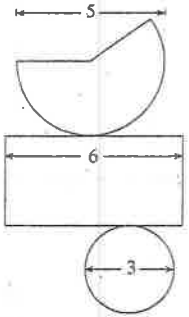

A.



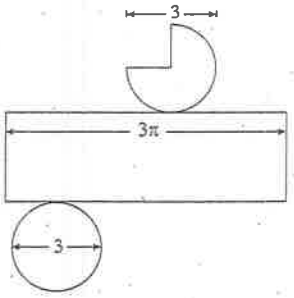

B.



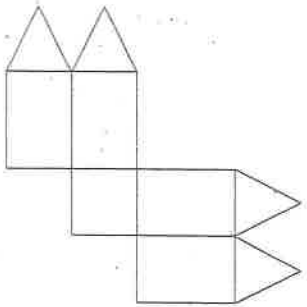

C.




D.

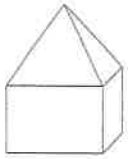


14. Which prism can be formed by the net below? Note: all diagrams drawn to scale.

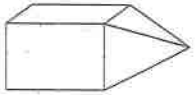


Note: all diagrams drawn to scale.

A.

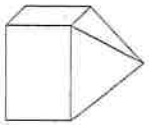


B.



C.

D.





## PART B: NUMERIC-RESPONSE QUESTIONS

15. The lateral surface area of a cylinder is 1106 $cm^2$. Given that the height is 11 cm, calculate the radius. Answer to the nearest cm.

# Foundations of Mathematics and Pre-Calculus 10

## Sample Items – Measurement

Answer Key

**Cognitive Processes**
N = Knowing
P = Applying
Q = Reasoning

**Question Types**
= Multiple Choice – no calculator (MN)
= Multiple Choice (MC)
= Numerical Response (NR)

**Topics**
1. Measurement
2. Algebra and Number
3. Relations and Functions

**Prescribed Learning Outcomes (PLOs)**
A
B
C

| Question Number | Keyed Response | Cognitive Process | Mark | Topic | PLO | Question Type |
|---|---|---|---|---|---|---|
| 1. | B | N | 1 | 1 | A1 | MN |
| 2. | C | Q | 1 | 1 | A3 | MC |
| 3. | C | Q | 1 | 1 | A3, B4 | MC |
| 4. | D | P | 1 | 1 | A4 | MC |
| 5. | A | P | 1 | 1 | A3 | MC |
| 6. | D | Q | 1 | 1 | A3 | MC |
| 7. | B | Q | 1 | 1 | A3, A4 | MC |
| 8. | B | Q | 1 | 1 | A3, A4 | MC |
| 9. | C | N | 1 | 1 | A4 | MC |
| 10. | A | P | 1 | 1 | A4 | MC |
| 11. | A | N | 1 | 1 | A3 | MC |
| 12. | B | Q | 1 | 1 | A3 | MC |
| 13. | A | Q | 1 | 1 | A3 | MC |
| 14. | C | P | 1 | 1 | A3 | MC |
| 15. | 16 | P | 1 | 1 | A3 | NR |

# PART 2 - ALGEBRA + NUMBERS

## PART A: MULTIPLE-CHOICE QUESTIONS

1. Which of the following powers is a perfect cube?

   A. $3^2$
   B. $5^6$
   C. $6^4$
   D. $9^2$

2. Write as a single power: $\frac{12^3}{4^3}$

   A. $3^0$
   B. $3^3$
   C. $8^3$
   D. $48^6$

3. Given $x > 1$, arrange from the least to the greatest:

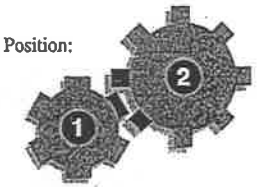
$$\sqrt{x},\ \frac{1}{\sqrt[3]{x}},\ \sqrt[3]{x^2}$$

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



4. Two gears are shown below in their starting position.
   - Gear 1 has 6 teeth.
   - Gear 2 has 8 teeth.
   - As Gear 1 turns, it causes Gear 2 to turn at a different rate.
   - Gear 1 is rotated until the two gears are back to this starting position.

Starting Position:




What is the minimum number of rotations Gear 1 requires to return to this starting position?

   A. 48 rotations
   B. 24 rotations
   C. 4 rotations
   D. 2 rotations

5. Three students were asked to show steps for simplifying $\sqrt[3]{1080}$ to $6\sqrt[3]{5}$.

| Jean | Sally | Mark |
|---|---|---|
| $\sqrt[3]{1080} = \sqrt[3]{2\times2\times2\times3\times3\times3\times5}$<br>$= (2+3)\left(\sqrt[3]{5}\right)$<br>$= 6\sqrt[3]{5}$ | $\sqrt[3]{1080} = \sqrt[3]{216\times5}$<br>$\sqrt[3]{216} = 6$<br>$\therefore \sqrt[3]{1080} = 6\sqrt[3]{5}$ | $\sqrt[3]{1080} = \sqrt[3]{27\times5\times8}$<br>$= 3\times\sqrt[3]{5}\times2$<br>$= 6\sqrt[3]{5}$ |

Which student made a mistake, if any?

   A. Jean
   B. Sally
   C. Mark
   D. All of them show correct work.

6. Simplify: $\left(\frac{-54x^6y}{2x^{-3}y^4}\right)^{\frac{4}{3}}$

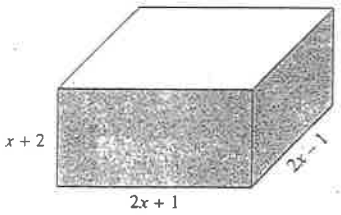
A. $-36x^4y^4$

B. $-\frac{36x^{12}}{y^4}$

C. $81x^4y^4$

D. $\frac{81x^{12}}{y^4}$

7. Determine a simplified expression for the lateral surface area of the prism below.




A. $8x^2 + 16x$

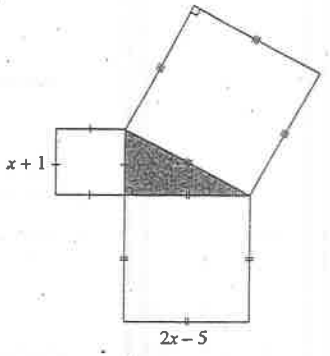
B. $8x^2 + 20x + 8$

C. $16x^2 + 16x - 2$

D. $4x^3 + 8x^2 - x - 2$



8. Determine an expression for the area of the largest square in the diagram below.




A. $4x^2 + 25$

B. $4x^2 - 20x + 25$

C. $5x^2 + 26$

D. $5x^2 - 18x + 26$

9. Derek expanded and simplified $(x-3)(2x^2+5x-8)$ as shown below.

| | $x$ | $-3$ | |
|---|---|---|---|
| $2x^3$ | $2x^2$ | $-6x$ | Step I |
| $+5x$ | $5x^2$ | $-15x$ | Step II |
| $-8$ | $-8x$ | $-24$ | Step III |
| $= 2x^3 - x^2 - 23x - 24$ | | | Step IV |

In which step is Derek's first mistake?

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

10. When $5x^2 - 20$ is factored, how many factors are in the result?

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

11. One of the factors of $(3x^2 - 16x + k)$ is $(x - 7)$. Determine the value of $k$.

A. –35
B. –9
C. 5
D. 63

12. When factoring $x^2 - 7x + 6$ to the form $(x + a)(x + b)$, which two of the following characteristics are true?

| | |
|---|---|
| I. | $ab = -7 \quad a + b = 6$ |
| II. | $ab = 6 \quad a + b = -7$ |
| III. | $a > 0$ and $b > 0$ |
| IV. | $a < 0$ and $b < 0$ |
| V. | $a > 0$, $b < 0$ or $a < 0$, $b > 0$ |

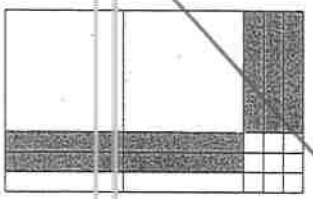
A. I and III
B. I and IV
C. II and IV
D. II and V



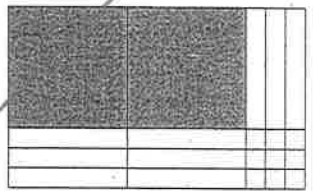
13. Which of the following areas formed by math tiles is factorable?

OMIT

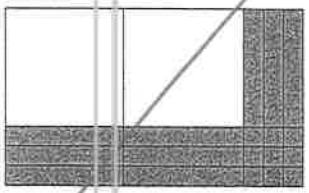
A.



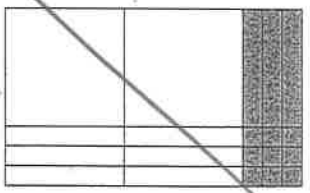
B.



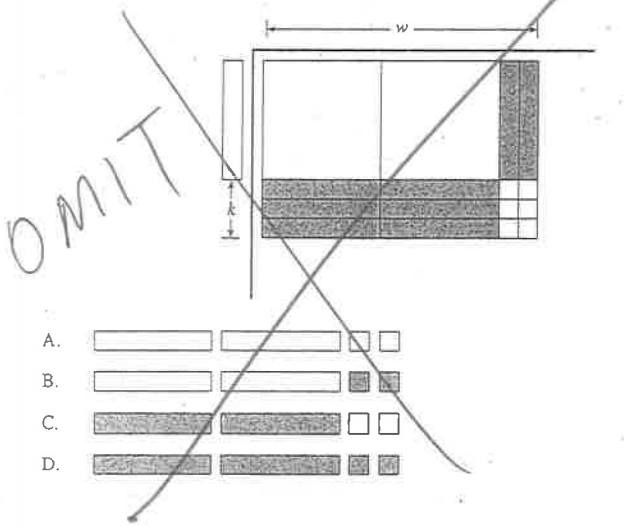
C.



D.



14. Determine the missing tiles, labelled $w$, in the tile model below.




OMIT

A.

B.

C.

D.



## PART B: NUMERIC-RESPONSE QUESTIONS

15. Given $\sqrt[n]{x^{10}} = x^2$, determine the value of $n$. Answer to the nearest integer.

16. When $\left(\sqrt[5]{7^9}\right)\left(\sqrt[5]{7^3}\right)$ is simplified to $7^n$, determine the value of $n$. Answer to two decimal places.

# Foundations of Mathematics and Pre-Calculus 10

## Sample Items — Algebra and Numbers

Answer Key

| Cognitive Processes | Question Types |
|---|---|
| N = Knowing | = Multiple Choice – no calculator (MN) |
| P = Applying | = Multiple Choice (MC) |
| Q = Reasoning | = Numerical Response (NR) |

| Topics | Prescribed Learning Outcomes (PLOs) |
|---|---|
| 1. Measurement | A |
| 2. Algebra and Number | B |
| 3. Relations and Functions | C |

| Question Number | Keyed Response | Cognitive Process | Mark | Topic | PLO | Question Type |
|---|---|---|---|---|---|---|
| 1. | B | N | 1 | 2 | B1 | MN |
| 2. | B | N | 1 | 2 | B3 | MN |
| 3. | A | Q | 1 | 2 | B3 | MC |
| 4. | C | P | 1 | 2 | B1 | MC |
| 5. | A | P | 1 | 2 | B2 | MC |
| 6. | D | P | 1 | 2 | B3 | MC |
| 7. | A | Q | 1 | 2 | B4, A3 | MC |
| 8. | D | Q | 1 | 2 | B4, A4 | MC |
| ~~9.~~ | ~~C~~ | P | 1 | 2 | B4 | MC |
| 10. | B | N | 1 | 2 | B5 | MC |
| 11. | A | Q | 1 | 2 | B5 | MC |
| 12. | C | Q | 1 | 2 | B5 | MC |
| ~~13.~~ | ~~D~~ | P | 1 | 2 | B5 | MC |
| ~~14.~~ | ~~B~~ | N | 1 | 2 | B5 | MC |
| 15. | 5 | N | 1 | 2 | B3 | NR |
| 16. | 2.85 | P | 1 | 2 | B3 | NR |

# PART 3 - RELATIONS + FUNCTIONS

## PART A: MULTIPLE-CHOICE QUESTIONS

1. Determine the $x$-value of the point of intersection for the system represented by $f(x) = 3$ and $g(x) = \frac{5}{2}x + 1$.

   A. 0.8
   B. 1.6
   C. 5
   D. 8

2. In which quadrant does the following system contain a solution?

$$y = 2x + 1$$
$$y - 1 = \frac{1}{2}(x - 2)$$

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

3. Determine the solution to the following linear system:

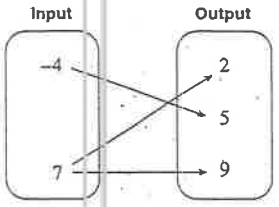
$$y = -2x + 5$$
$$4x + 2y - 15 = 0$$

   A. $(5, -5)$
   B. $(5, -2.5)$
   C. There is no solution.
   D. There are infinite solutions.

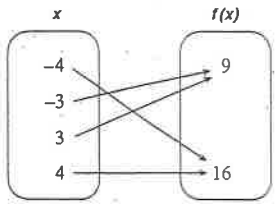


4. Which of the following relations is **not** a function?

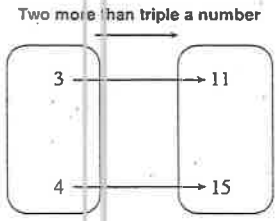
   A.



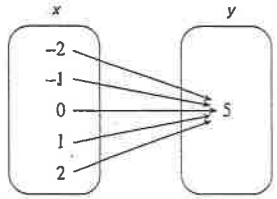

   B.




   C.



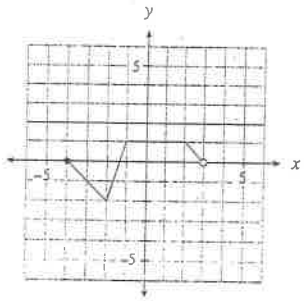

   D.




5. The altitude of a plane is a function of the time since takeoff. Identify the dependent variable.

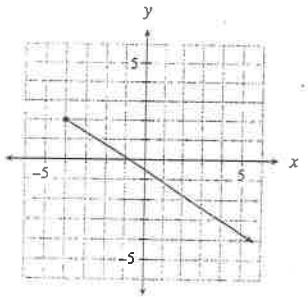
   A. time
   B. speed
   C. altitude
   D. acceleration

6. Determine the domain of the following relation.




A. $(-4, 3)$
B. $[-4, 3)$
C. $(-4, 3]$
D. $[-4, 3]$

7. Determine the range of the following relation.




A. $(-\infty, \infty)$
B. $(-\infty, 2]$
C. $[-4, \infty)$
D. $(2, \infty]$



8. A bag of caramel candies has a total mass of 180 g, excluding the mass of the bag. Each candy has a mass of 6 g. As a candy is taken out of the bag and eaten, the mass of the remaining candies is plotted versus how many candies are left in the bag. Determine the range for this relation.

A. $\{0, 1, 2, 3, \ldots, 30\}$
B. $\{0, 6, 12, \ldots, 180\}$
C. $\{0, 1, 2, 3, 4, 5, 6\}$
D. all real numbers

9. Determine the equation of the line that passes through $A(6, 0)$ and is perpendicular to the line formed by $B(-4, 9)$ and $C(-7, 10)$.

A. $y = 3x - 18$

B. $y = 3x + 18$

C. $y = \frac{1}{3}x + 2$

D. $y = \frac{1}{3}x - 2$

10. A boat took 3 hours to travel 24 km with the current. On the return trip, the boat took 5 hours to travel 24 km against the current. Determine the speed of the current.

A. 1.6 km/h
B. 4 km/h
C. 6.4 km/h
D. 24 km/h

## PART B: NUMERIC-RESPONSE QUESTIONS

11. Two acid solutions are to be mixed together.

- Solution A is 30% acid by volume.
- Solution B is 70% acid by volume.

How much of solution A is needed to mix with solution B to make an 800 mL mixture that is 54% acid by volume? Answer to the nearest millilitre.

# Foundations of Mathematics and Pre-Calculus 10

## Sample Items — Relations and Functions

Answer Key

| Cognitive Processes | Question Types |
|---|---|
| N = Knowing | = Multiple Choice – no calculator (MN) |
| P = Applying | = Multiple Choice (MC) |
| Q = Reasoning | = Numerical Response (NR) |

| Topics | Prescribed Learning Outcomes (PLOs) |
|---|---|
| 1. Measurement | A |
| 2. Algebra and Number | B |
| 3. Relations and Functions | C |

| Question Number | Keyed Response | Cognitive Process | Mark | Topic | PLO | Question Type |
|---|---|---|---|---|---|---|
| 1. | A | N | 1 | 3 | C8 | MN |
| 2. | C | P | 1 | 3 | C9 | MN |
| 3. | C | P | 1 | 3 | C9 | MC |
| 4. | A | N | 1 | 3 | C2 | MC |
| 5. | C | P | 1 | 3 | C4 | MC |
| 6. | B | N | 1 | 3 | C1 | MC |
| 7. | B | N | 1 | 3 | C5 | MC |
| 8. | B | P | 1 | 3 | C5 | MC |
| 9. | A | P | 1 | 3 | C7 | MC |
| 10. | A | Q | 1 | 3 | C9 | MC |
| 11. | 320 | Q | 1 | 3 | C9 | NR |

# FORMULA SHEETS

FORMULA

SHEETS

## UNIT CONVERSION

| | Common Imperial | Imperial and Metric | Metric |
|---|---|---|---|
| **Length** | 1 mile = 1760 yards<br>1 mile = 5280 feet<br>1 yard = 3 feet<br>1 yard = 36 inches<br>1 foot = 12 inches | 1 mile ≈ 1.609 km<br>1 yard ≈ 0.9144 m<br>1 foot ≈ 0.3048 m<br>1 inch ≈ 2.54 cm | 1 km = 1000 m<br>1 m = 100 cm<br>1 cm = 10 mm |
| **Mass (Weight)** | 1 ton = 2000 pounds<br>1 pound = 16 ounces | 1 pound ≈ 0.454 kg<br>1 ounce ≈ 28.35 g | 1 t = 1000 kg<br>1 kg = 1000 g |
| **Common Abbreviations** | mile = mi<br>yard = yd<br>ton = ton<br>feet = ' or ft<br>inch = " or in<br>pound = lb<br>ounce = oz | | kilometre = km<br>metre = m<br>centimetre = cm<br>millimetre = mm<br>tonne (metric ton) = t<br>gram = g |

## FORMULAE

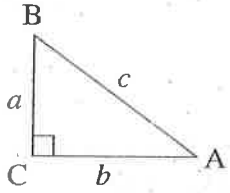
(Put your calculator in Degree Mode)

- 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***

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

distance = speed × time

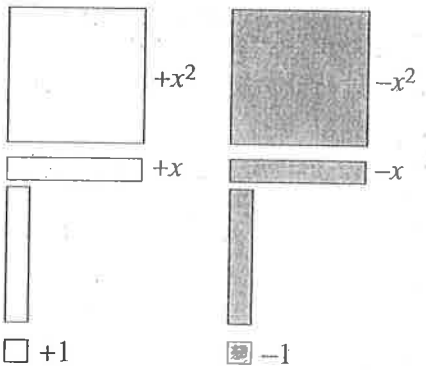
- The equation of a line:

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

- The slope of a line:

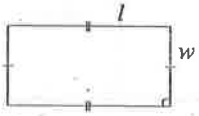
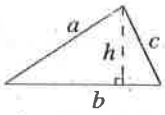
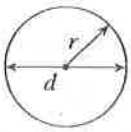
$$m = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

**Math Tiles Legend**

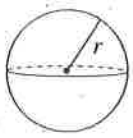
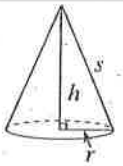
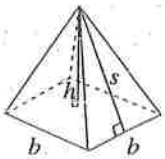
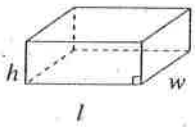


## GEOMETRIC FORMULAE

| 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 $\pi$ programmed in your calculator rather than the approximation of 3.14.

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