

ALBERTA DISTANCE LEARNING CENTRE

FINAL EXAM

MAT1791 Mathematics 10C

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Mathematics 10C
Final Exam - TLS
September 2014
Revised Nov. 2014

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ALBERTA DISTANCE LEARNING CENTRE

FINAL EXAM

This page must not be detached. After the exam has been written, the student and the supervisor must complete this page and return it with the exam.

STUDENT'S DECLARATION

I, _____, File No. _____

hereby certify that

1. I have done all the work on this exam in _____
(subject/course)
without giving or receiving any help whatsoever;
2. I have written this exam at _____
(city, town, or village)
_____ (if not at a school, state where)
on _____ between the hours of _____ and _____
(day) (month) (year)
3. This exam was written under the following conditions (State disturbing factors such as noise, interruptions, ill health, if any; otherwise, write NORMAL.)

Student's Signature

SUPERVISOR'S DECLARATION

I, _____
(profession or position)

hereby certify that in accordance with the Directions to Supervisors

1. I have supervised the writing of this exam;
2. The identity of the student was verified;
3. All work done on this exam is the student's own;
4. The student gave no assistance to any other student;
5. The statements made by the student concerning the conditions under which the exam was written are accurate.

Supervisor's Signature

MATHEMATICS 10C**FINAL EXAM****GENERAL INSTRUCTIONS**

YOU HAVE THREE HOURS TO COMPLETE THIS EXAM. This is a closed-book exam, written and supervised at an ADLC-approved location.

This exam includes multiple choice and short answer questions. For multiple choice questions, select the best answer. Each is worth 1 mark. Marks assigned to short answer questions are indicated for each question.

Work through the entire exam, answering the questions you are sure you know. You will then be able to concentrate on the questions of which you are not quite sure.

Be sure to show all necessary work.

Graphing or scientific calculators may be used. Formula sheets are provided at the end of the exam.

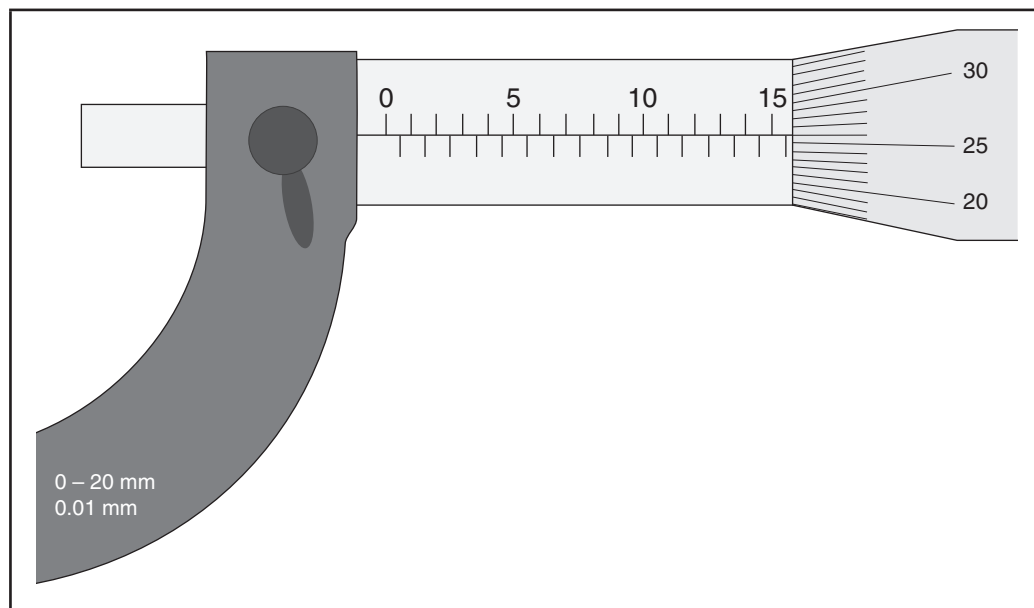
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PART A: MULTIPLE CHOICE

Read each multiple choice question carefully and decide which of the choices **best** completes the statement or answers the question. Place the letter that corresponds to the correct answer on the line in front of the question. Each question is worth 1 mark.

- _____ 1. Approximately how many unused pencil lengths (7 inches) would cover the distance from the floor to a typical door knob, approximately 1 yard?
- A. 2 pencil lengths
B. 3 pencil lengths
C. 5 pencil lengths
D. 9 pencil lengths

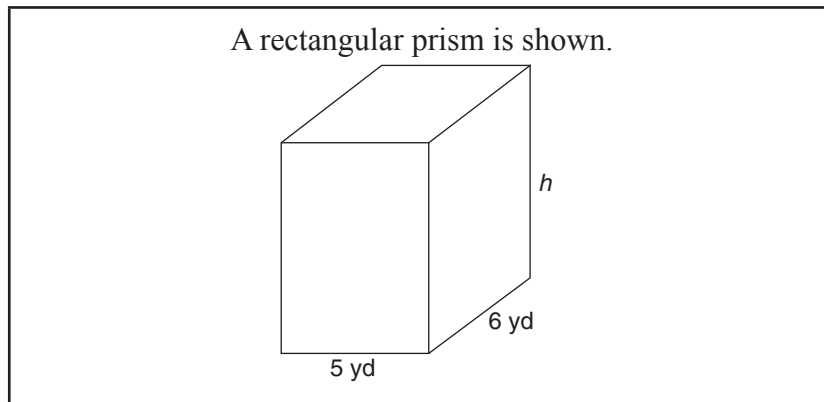
Use the following information to answer question 2.



- _____ 2. The micrometer measurement shown is
- A. 15.26 mm
B. 15.526 mm
C. 15.76 mm
D. 150.26 mm

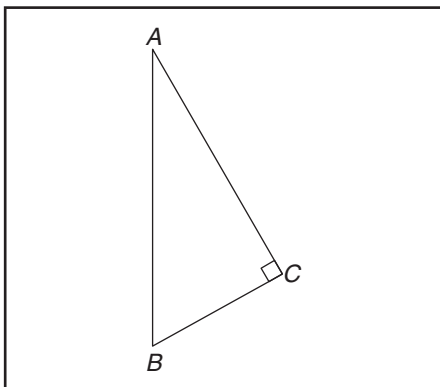
- _____ 3. Which of the following measurements is **not** equivalent to 7 m?
- A. 70 cm
 - B. 7.658 yd
 - C. 22.967 ft
 - D. 0.007 km

Use the following information to answer question 4.



- _____ 4. If the rectangular prism shown has a surface area of 214 yd^2 , what is the height of the prism, to the nearest tenth of a yard?
- A. 7.0 yd
 - B. 7.1 yd
 - C. 12.5 yd
 - D. 14.0 yd
- _____ 5. The diameter of a tennis ball is 6.7 cm, and the diameter of a cricket ball is 7.0 cm. To the nearest cubic centimetre, the difference in their volumes is
- A. 4 cm^3
 - B. 12 cm^3
 - C. 22 cm^3
 - D. 177 cm^3

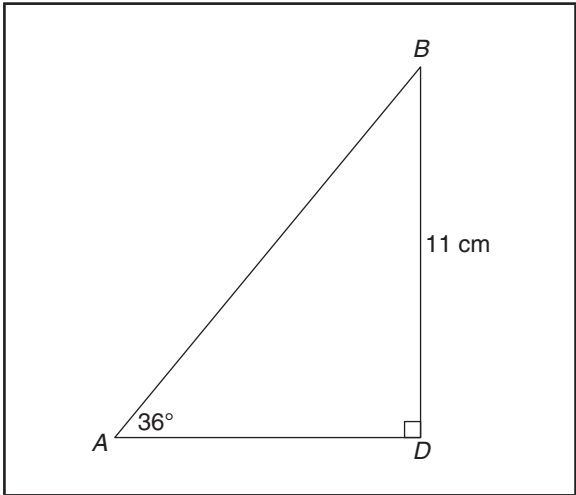
Use the following information to answer question 6.



- _____ 6. Which row in the following table correctly identifies the hypotenuse, adjacent side, and opposite side of triangle ABC , if the reference angle is angle A ?

Row	Side AB	Side BC	Side AC
A.	adjacent	opposite	hypotenuse
B.	adjacent	hypotenuse	opposite
C.	hypotenuse	opposite	adjacent
D.	hypotenuse	adjacent	opposite

Use the following information to answer question 7.

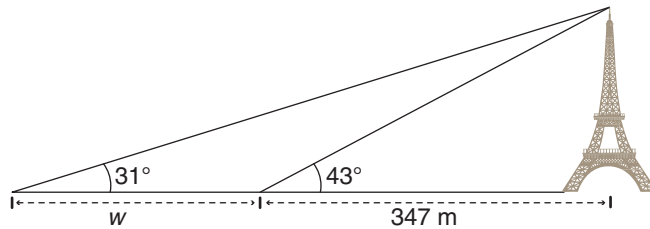


- _____ 7. Which row in the following table correctly identifies the unknown side lengths and angle measure of the triangle shown?

Row	Side <i>AD</i>	Side <i>AB</i>	$\angle ABD$
A.	8.0 cm	13.6 cm	54°
B.	13.6 cm	8.0 cm	54°
C.	15.1 cm	18.7 cm	54°
D.	18.7 cm	15.1 cm	54°

Use the following information to answer question 8.

Mohammad views the top of the Eiffel Tower from 347 m away. He then moved w metres to view the tower from a second location. The angle of elevation changed from 43° to 31° as shown in the diagram below.



- _____ 8. The Eiffel Tower is _____ m tall and Mohammad moved _____ m to view the tower from the second location.
- A. 237, 112
 B. 255, 51
 C. 324, 192
 D. 324, 539

Use the following information to answer question 9.

Steve and Allan each worked to simplify separate exponential expressions. Their work is shown.

Steve	Allan
$\left(\frac{5^3}{(7-3^2)}\right)^{-2}$ $= \left(\frac{5^3}{-2}\right)^{-2}$ $= \frac{5^{-6}}{(-2)^{-2}}$	$\left(\frac{3a^2b^{-3}}{a^4}\right)^{-3}$ $= \frac{3a^{-6}b^9}{a^{-12}}$ $= \frac{b^9}{3a^{-6}}$

- _____ 9. Which of the following statements about Steve and Allan's work is **true**?
- A. Both students' work is correct.
 B. Both students' work contains errors.
 C. Allan's work is correct, but Steve's work contains errors.
 D. Allan's work contains errors, but Steve's work is correct.

- _____ 10. Which of the following irrational numbers could be used to represent the length of the hypotenuse of a right triangle with leg lengths of 7 inches and 5 inches?
- A. $\sqrt{12 \text{ in}^2}$
 - B. $\sqrt{24 \text{ in}^2}$
 - C. $\sqrt{74 \text{ in}^2}$
 - D. $\sqrt{148 \text{ in}^2}$
- _____ 11. Which of the following statements is **incorrect**?
- A. $\sqrt{x^4 z^{16}} = x^2 z^8$
 - B. $\sqrt{(6a)} = (6a)^{\frac{1}{2}}$
 - C. $\sqrt{16y^5} = (16y^5)^{\frac{1}{2}}$
 - D. $(\sqrt[4]{-7})^{-2} = 7^{\frac{1}{2}}$
- _____ 12. Which of the following expressions shows the fully factored form of $3x^5y^6 + 6x^7y^5 - 9xy^4$?
- A. $xy^4(3xy^2 + 6x^6y - 9)$
 - B. $3xy^4(x^4y^2 + 2x^6y - 3)$
 - C. $3xy^4(xy^2 + 2x^6y - 3x)$
 - D. $3xy(xy^4 + 2x^6y^2 - 3y^3)$

Use the following information to answer question 13.

Julie verified the factored form of the trinomial $x^2 - 2x - 15$ by substituting 2 for x . Her work is shown in the table.	
Factored Form	Original Trinomial
$x^2 - 2x - 15$	$x^2 - 2x - 15$
$= (x - 5)(x + 3)$	$= (2)^2 - 2(2) - 15$
$= ((2) - 5)((2) + 3)$	$= 4 - 4 - 15$
$= -3 \cdot 5$	$= -15$
$= -15$	

- _____ 13. The table shows that
- A. one factor of the trinomial is 2.
 - B. one factor of the trinomial is -15 .
 - C. the factored form and the original trinomial are equivalent for $x = 2$.
 - D. the factored form and the original trinomial are not equivalent for $x = 2$.

Use the following information to answer question 14.

Joe factored the polynomial $8x^2 + 20x + 12$, and recorded his work.
Step 1: $8x^2 + 20x + 12$
Step 2: $8x^2 + 24x - 4x + 12$
Step 3: $8x(x + 3) - 4(x + 3)$
Step 4: $(8x - 4)(x + 3)$

- _____ 14. In which step did Joe make his first error?
- A. Step 1
 - B. Step 2
 - C. Step 3
 - D. Step 4

Use the following information to answer questions 15 and 16.

Nicole multiplied $(n + 3)(n^2 - 2n - 5)$ using the table shown.

$\times$	n^2	$-2n$	-5
n	$2n^2$	$-n$	$-5n$
3	$4n^2$	$-6n$	15

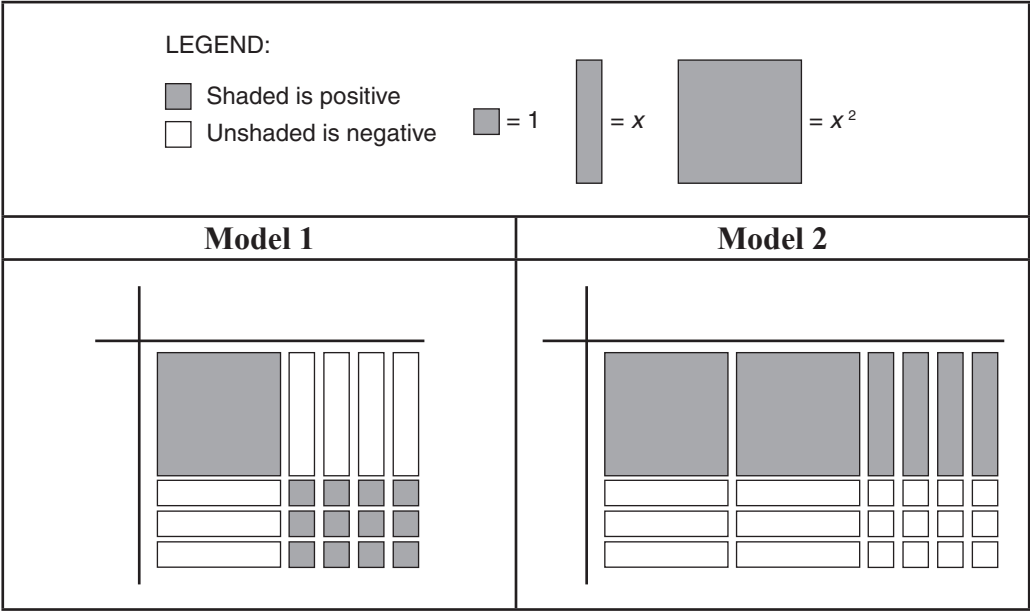
_____ 15. How many of the products are **correct**?

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

_____ 16. The correct expansion of the factors, in simplified form, is

- A. $n^3 + n^2 + n - 15$
- B. $n^3 + n^2 - 11n + 15$
- C. $n^3 + n^2 - 11n - 15$
- D. $n^3 - 5n^2 + 11n - 15$

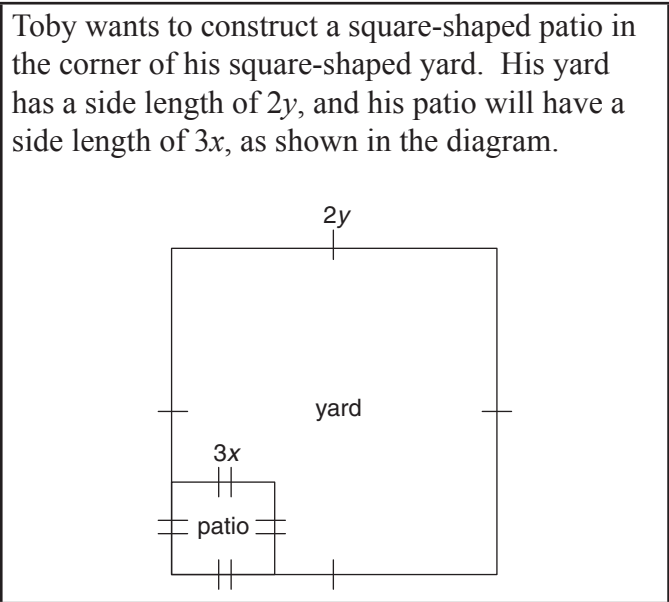
Use the following information to answer question 17.



_____ 17. Which row in the following table correctly corresponds to the two models?

Row	Model 1	Model 2
A.	$x^2 - 7x + 12$	$(2x + 4)(x - 3)$
B.	$x^2 + 7x - 12$	$(x^2 - 3)(2x^2 + 4)$
C.	$(x + 4)(x - 3)$	$2x^2 - 6x - 12$
D.	$(x^2 + 7x)(x - 12)$	$2x^2 + 6x - 12$

Use the following information to answer question 18.



- _____
18. Which row in the following table represents an expression for the area of the lawn that will remain after the patio is built, along with the factored form of that area expression?

Row	Remaining Lawn Area	Factored Form of Remaining Lawn Area
A.	$4y^2 + 9x^2$	$(2y + 3x)(2y + 3x)$
B.	$4y^2 - 9x^2$	$(2y + 3x)(2y - 3x)$
C.	$9x^2 - 4y^2$	$(3x + 2y)(3x - 2y)$
D.	$9x^2 + 4y^2$	$(3x + 2y)(3x + 2y)$

- _____
19. Find an integer to replace $\square$ in the expression $121a^2 - \square ab + 25b^2$, such that the trinomial is a perfect square.
- A.

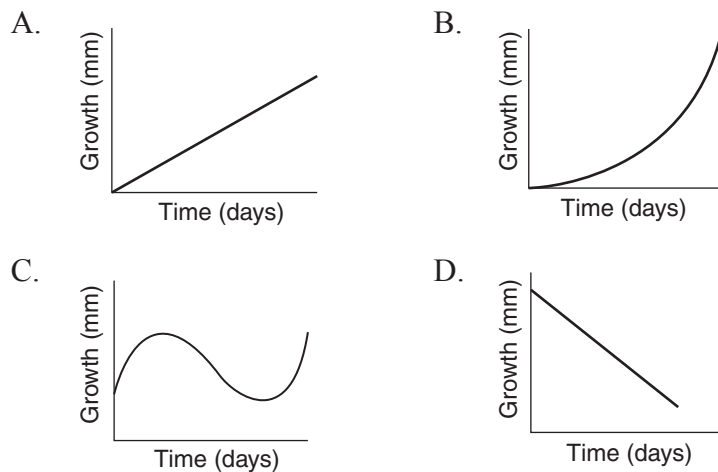
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- B.

55
- C.

110
- D.

146

- _____ 20. Which of the following graphs best represents the growth of a plant over one week if the plant grows 2 mm each day?

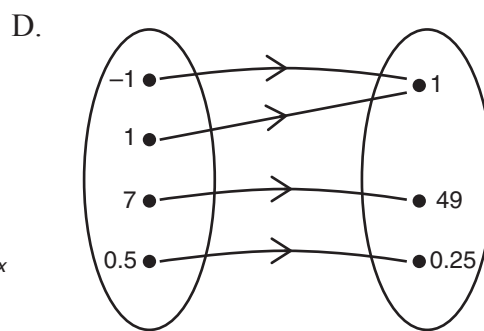
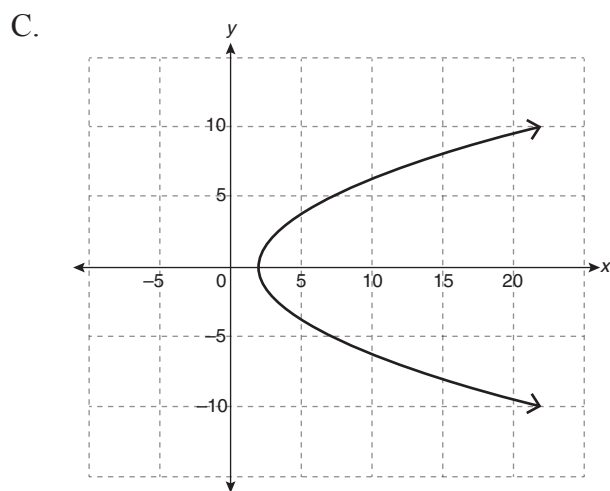


- _____ 21. Which of the following relations is a function?

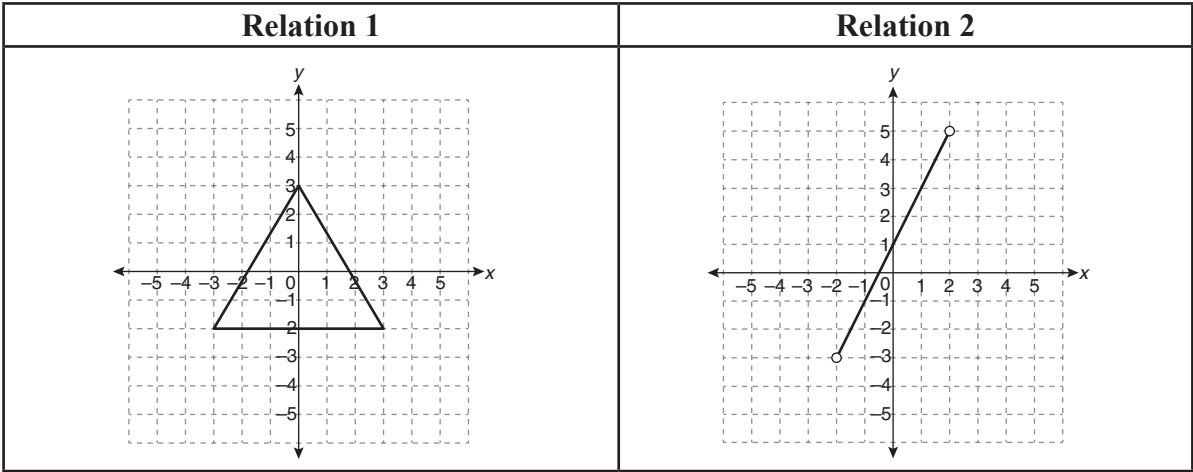
A.

x	0	2	2
y	4	1	3

B. $\{(1, 2), (1, 3), (5, 7), (5, 3)\}$



Use the following information to answer question 22.



_____ 22. Which row in the following table correctly identifies the domain for Relation 1 and the range for Relation 2?

Row	Domain of Relation 1	Range of Relation 2
A.	$(-3, 3]$	$[-3, 5)$
B.	$[-3, 3)$	$(-3, 5]$
C.	$\{x \mid -2 \leq x \leq 3, x \in \mathbb{R}\}$	$\{y \mid -3 \leq y \leq 5, x \in \mathbb{R}\}$
D.	$\{x \mid -3 \leq x \leq 3, x \in \mathbb{R}\}$	$\{y \mid -3 < y < 5, x \in \mathbb{R}\}$

Use the following information to answer questions 23 and 24.

The measure of each internal angle of a regular polygon is related by the number of sides, n , in the formula $\frac{180^\circ(n-2)}{n}$.

Number of Sides (n)	Internal Angle ($^\circ$)
3	60
4	90
5	108
6	120

- _____ 23. If Josh plots the data on a graph, he
- can connect the points because the data is discrete.
 - can connect the points because the data is continuous.
 - cannot connect the points because the data is discrete.
 - cannot connect the points because the data is continuous.
- _____ 24. If Josh constructs a graph based on the data, the labels for the axes would most closely resemble which of the following?

A.

Angle (Degrees)
Dependent Variable

Number of Sides
Independent Variable

B.

Number of Sides
Dependent Variable

Angle (Degrees)
Independent Variable

C.

Angle (Degrees)
Independent Variable

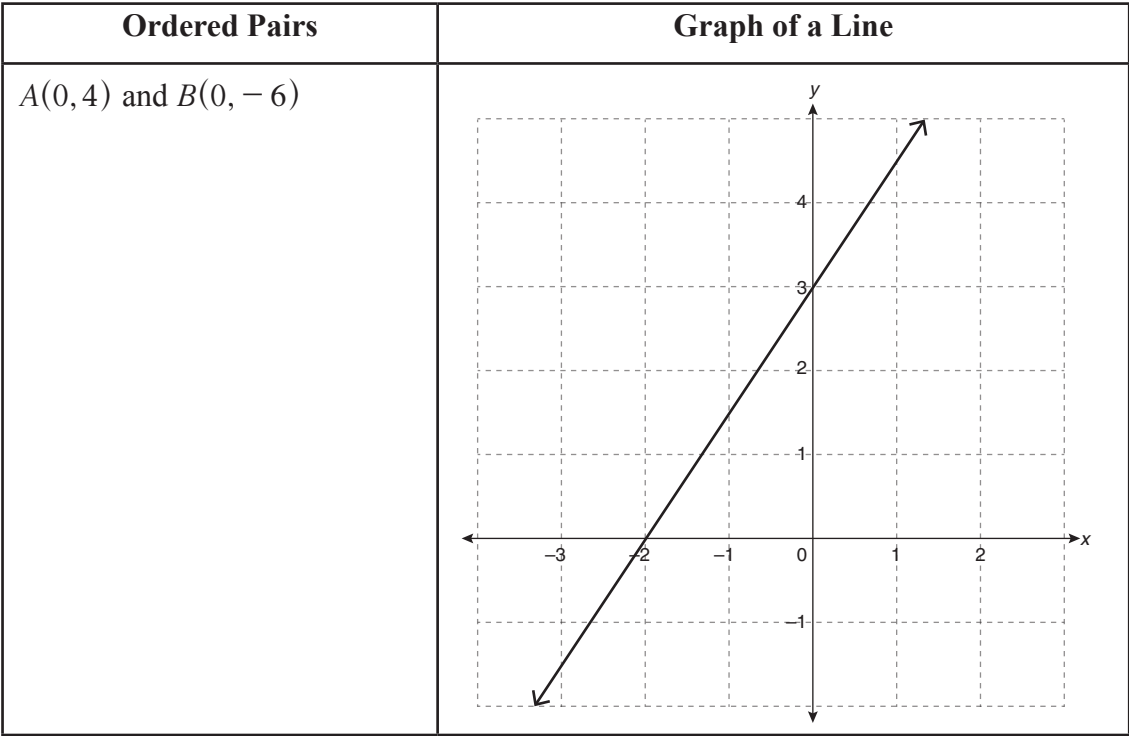
Number of Sides
Dependent Variable

D.

Number of Sides
Independent Variable

Angle (Degrees)
Dependent Variable

Use the following information to answer question 25.



_____ 25. Which row in the following table correctly identifies the slope of each linear relation provided?

Row	Ordered Pairs	Graph of Line
A.	$m_{AB} = \text{undefined}$	$m_{\text{line}} = \frac{2}{3}$
B.	$m_{AB} = \text{undefined}$	$m_{\text{line}} = \frac{3}{2}$
C.	$m_{AB} = 0$	$m_{\text{line}} = -\frac{2}{3}$
D.	$m_{AB} = 0$	$m_{\text{line}} = -\frac{3}{2}$

Use the following information to answer question 26.

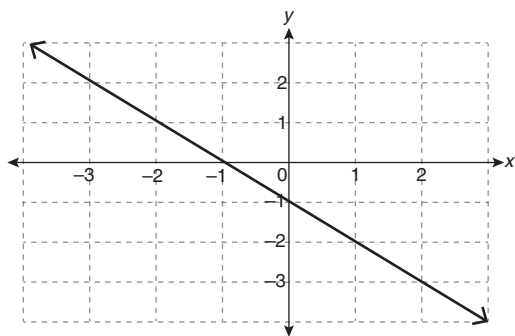
The volume of a cube is a function of its length, l .
 $V(l) = l^3$

_____ 26. What is the value of $V(3)$, to the nearest cubic unit?

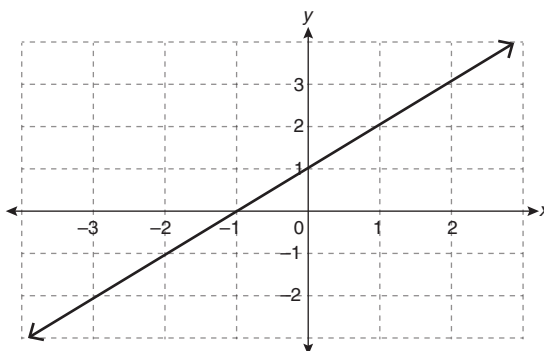
- A. $V(3) = 1 \text{ units}^3$
- B. $V(3) = 3 \text{ units}^3$
- C. $V(3) = 9 \text{ units}^3$
- D. $V(3) = 27 \text{ units}^3$

_____ 27. Which of the following graphs correspond to the relation $y = -x - 1$?

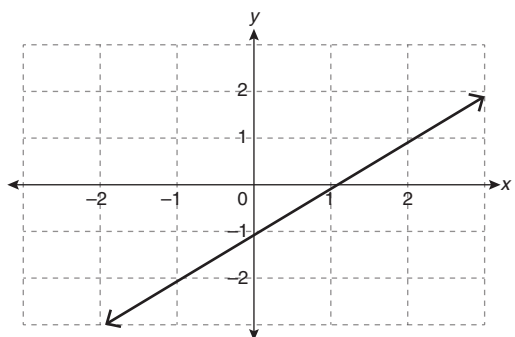
A.



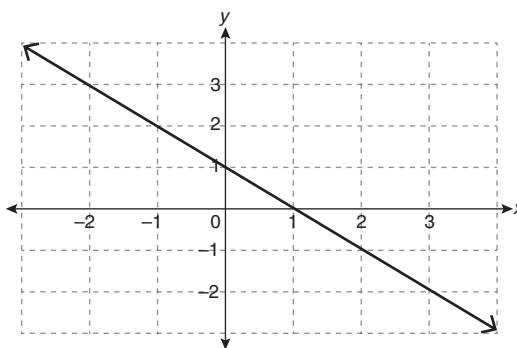
B.



C.



D.



Use the following information to answer question 28.

A student was asked to express the equation of the line $2x + 4y - 8 = 0$ in slope-intercept form. Her work is shown.

$$2x + 4y - 8 = 0$$

$$\text{Step 1: } 2x + 4y = -8$$

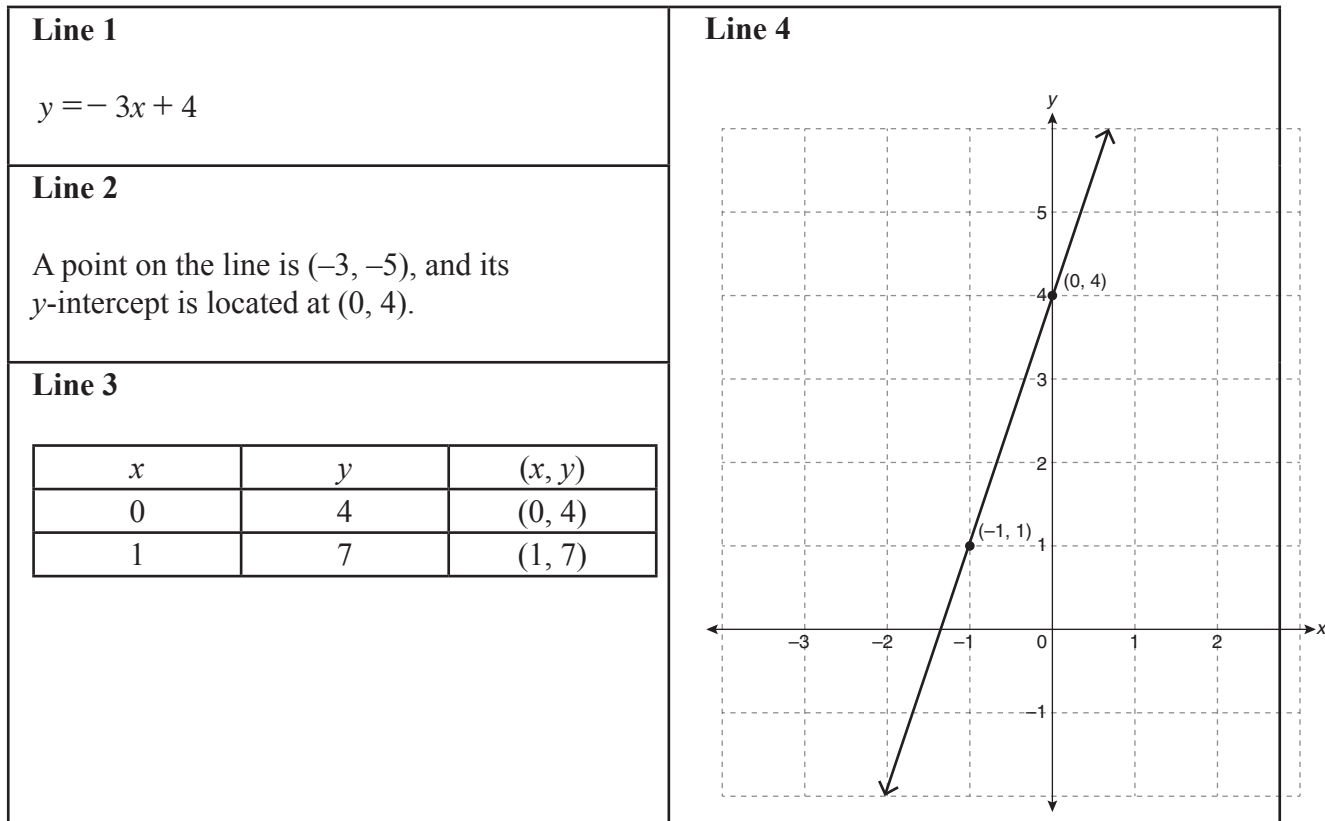
$$\text{Step 2: } 4y = 2x - 8$$

$$\text{Step 3: } y = \frac{1}{2}x - 2$$

_____ 28. In which two steps did the student make an error?

- A. Step 1 and Step 2
- B. Step 1 and Step 3
- C. Step 2 and Step 3
- D. No errors were made.

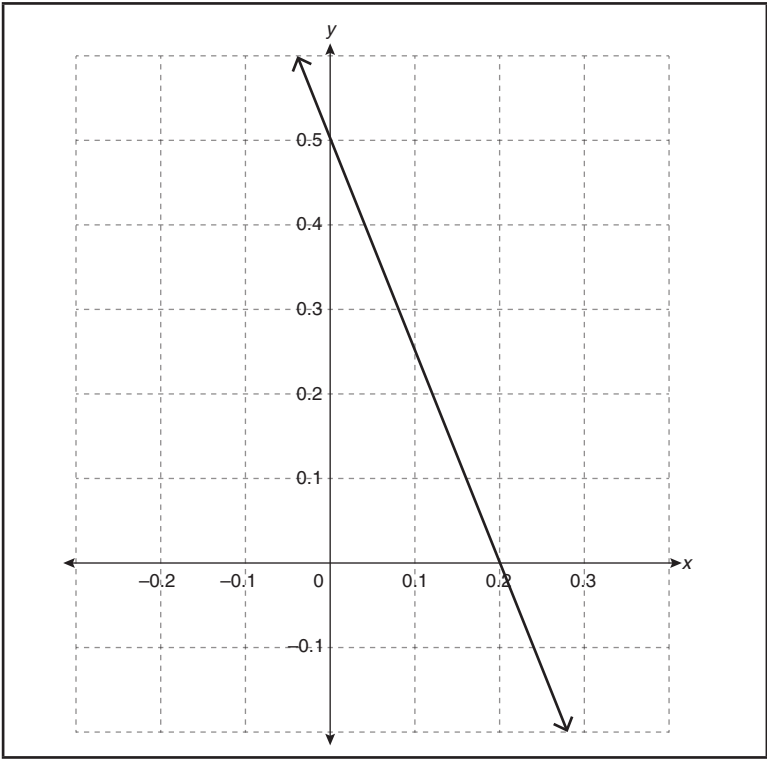
Use the following information to answer question 29.



_____ 29. Which of the four lines differs from the other three?

- A. Line 1
- B. Line 2
- C. Line 3
- D. Line 4

Use the following information to answer question 30.



_____ 30. Which row in the following table correctly identifies the slope, y-intercept, and equation of the line shown?

Row	Slope	y-intercept	Equation of the Line
A.	$m = -\frac{5}{2}$	$\frac{1}{2}$	$y = -\frac{5}{2}x + \frac{1}{2}$
B.	$m = -\frac{5}{2}$	$\frac{1}{5}$	$y = -\frac{5}{2}x + \frac{1}{5}$
C.	$m = \frac{5}{2}$	$\frac{1}{2}$	$y = \frac{5}{2}x + \frac{1}{2}$
D.	$m = \frac{5}{2}$	$\frac{1}{5}$	$y = \frac{5}{2}x + \frac{1}{5}$

- _____ 31. Expressed in general form, the equation $2y = -\frac{1}{3}x + 4$ is
- A. $0 = x + 6y - 12$
 - B. $0 = -x + 6y + 12$
 - C. $0 = \frac{1}{3}x + 2y - 4$
 - D. $0 = -\frac{1}{3}x - 2y + 4$

Use the following information to answer question 32.

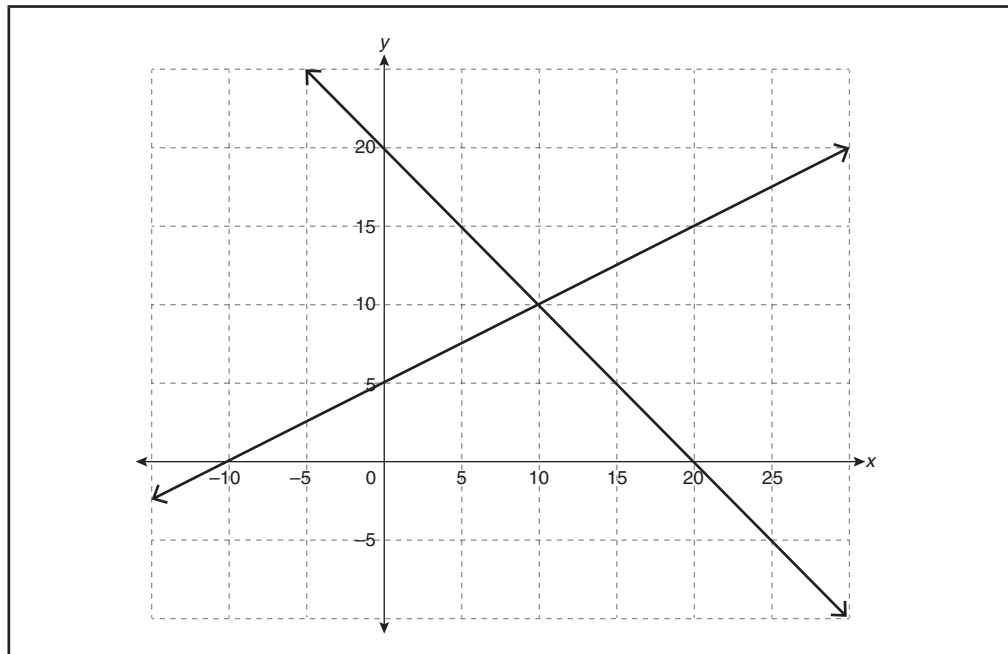
Jade went to the mall with \$300 to spend. She discovered a store with jeans on sale for \$25 and skirts on sale for \$15.

- _____ 32. Which row in the following table correctly identifies the equation of the linear relation representing the number of jeans and skirts Jade can purchase, along with the domain and range of the relation?

Row	Linear Equation	Domain	Range
A.	$x + y = 300$	$\{x \mid 0 \leq x \leq 12, x \in \mathbb{W}\}$	$\{y \mid 0 \leq y \leq 20, y \in \mathbb{W}\}$
B.	$x + y = 300$	$\{x \mid 0 \leq x \leq 12, x \in \mathbb{R}\}$	$\{y \mid 0 \leq y \leq 20, y \in \mathbb{R}\}$
C.	$25x + 15y = 300$	$\{x \mid 0 \leq x \leq 12, x \in \mathbb{W}\}$	$\{y \mid 0 \leq y \leq 20, y \in \mathbb{W}\}$
D.	$25x + 15y = 300$	$\{x \mid 0 \leq x \leq 12, x \in \mathbb{R}\}$	$\{y \mid 0 \leq y \leq 20, y \in \mathbb{R}\}$

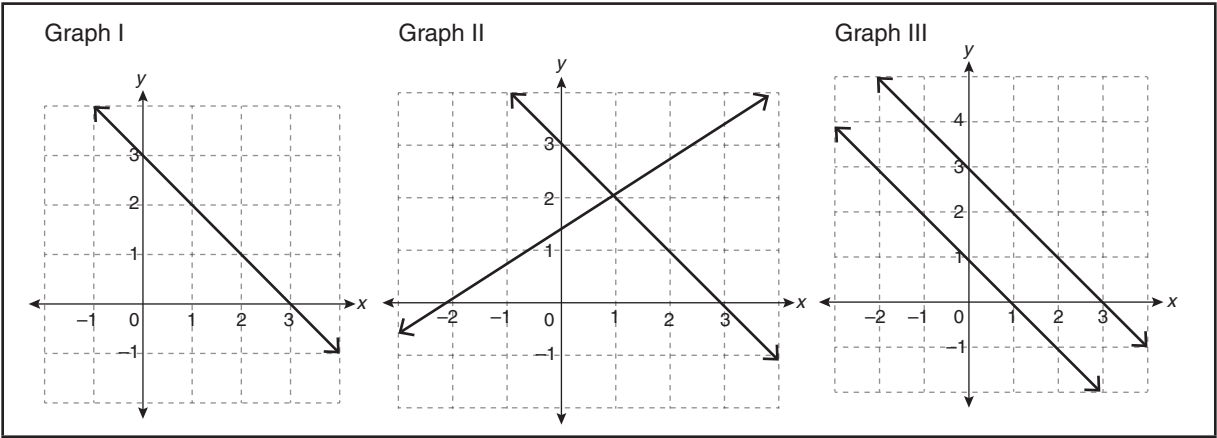
- _____ 33. Which of the following statements is **true**?
- A. Parallel lines have the same slope and the same y-intercept.
 - B. A line with an undefined slope is parallel to a line with a slope of zero.
 - C. The slopes of perpendicular lines are negative reciprocals of one another.
 - D. Two lines with undefined slopes are parallel to each other and parallel to the x -axis.

Use the following information to answer question 34.



- _____ 34. Which of the following linear systems is represented by the graph shown?
- A. $x - 2y = 10$
 $x - y = 20$
 - B. $x + 2y = 10$
 $-x - y = 20$
 - C. $-x + 2y = 10$
 $x + y = 20$
 - D. $-x + 2y = -10$
 $-x + y = -20$

Use the following information to answer question 35.



_____ 35. Which row in the following table correctly identifies the number of solutions to the system of equations represented on each graph?

Row	Graph I	Graph II	Graph III
A.	No solution	One solution	Infinite solutions
B.	One solution	No solution	Infinite solutions
C.	Infinite solution	No solutions	One solution
D.	Infinite solutions	One solution	No solution

Use the following information to answer questions 36 and 37.

Isla and Corey were asked to algebraically solve the following system of linear equations.

$$-3x + 4y = 13$$

$$2x - y = 3$$

Their partial solutions are shown below.

Isla's Solution	Corey's Solution
$-3x + 4y = 13$ $-3x + 4(-2x + 3) = 13$ $-3x - 8x + 12 = 13$	$2(-3x + 4y = 13)$ $3(2x - y = 3)$ $-6x + 8y = 26$ $\underline{6x - 3y = 9}$ $5y = 35$

_____ 36. Which of the following statements about the partial solutions is **true**?

- A. Both Isla and Corey have a correct partial solution.
- B. Neither Isla, nor Corey has a correct partial solution.
- C. Isla's partial solution contains an error, but Corey's is correct.
- D. Corey's partial solution contains an error, but Isla's is correct.

_____ 37. The solution to the system of equations is

- A. $x = 7, y = 5$
- B. $x = 5, y = 7$
- C. $x = \frac{1}{12}, y = -\frac{17}{6}$
- D. $x = -\frac{17}{6}, y = \frac{1}{12}$

- _____ 38. The difference between two numbers is 2. Their sum is 16. What is the product of the two numbers?
- A. -36
 - B. -16
 - C. 63
 - D. 72

Use the following information to answer question 39.

A landscaping company placed two orders with a nursery. The first order was for 12 bushes and 3 trees, and totalled \$417. The second order was for 6 bushes and 2 trees, and totalled \$232.

- _____ 39. If t represents the cost of one tree, and b represents the cost of one bush, which system of equations could be used to determine the cost of each item?
- A. $3b + 12t = 417$
 $6b + 2t = 232$
 - B. $12b + 3t = 232$
 $6b + 2t = 417$
 - C. $12b + 3t = 417$
 $6b + 2t = 232$
 - D. $12t + 3b = 417$
 $6t + 2b = 232$

Use the following information to answer question 40.

John has 592 coins in his piggy bank, worth a total of 11 605 cents.
The piggy bank contains only quarters and dimes.

_____ 40. How many dimes has John saved?

- A. 108
- B. 213
- C. 379
- D. 421

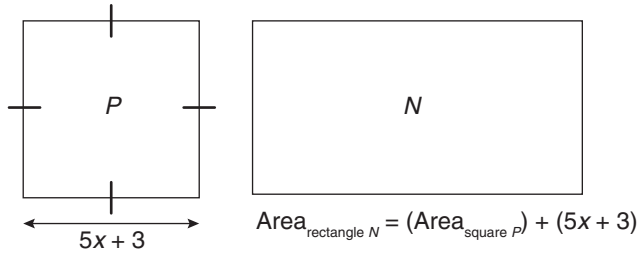
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PART B: WRITTEN RESPONSE

Please show all work when answering the following questions.

1. The side length of square P can be expressed by $(5x + 3)$ inches. The area of rectangle N is equal to the area of square P , increased by $(5x + 3)$ inches².



②

- a. Determine a simplified expression for the area of square P .

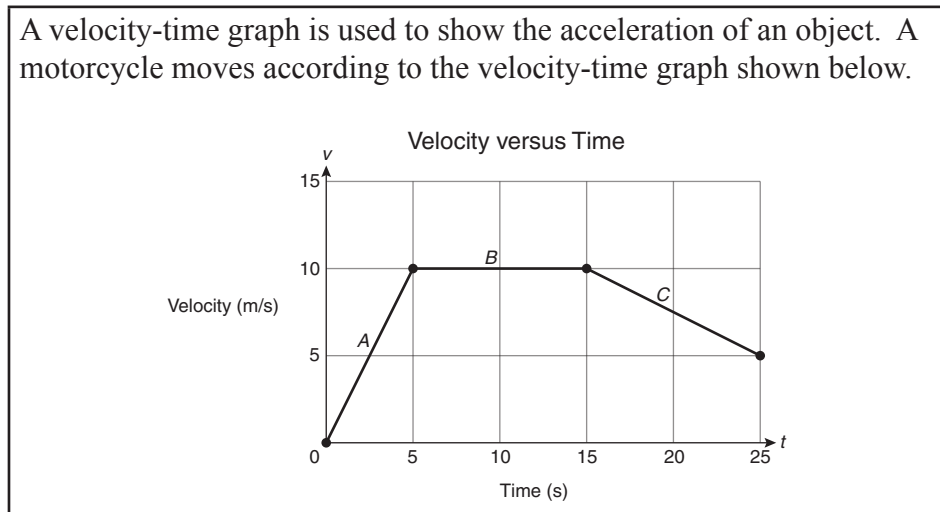
②

- b. Determine a simplified expression for the area of rectangle N .

②

- c. Fully factor the expression representing the area of rectangle N .

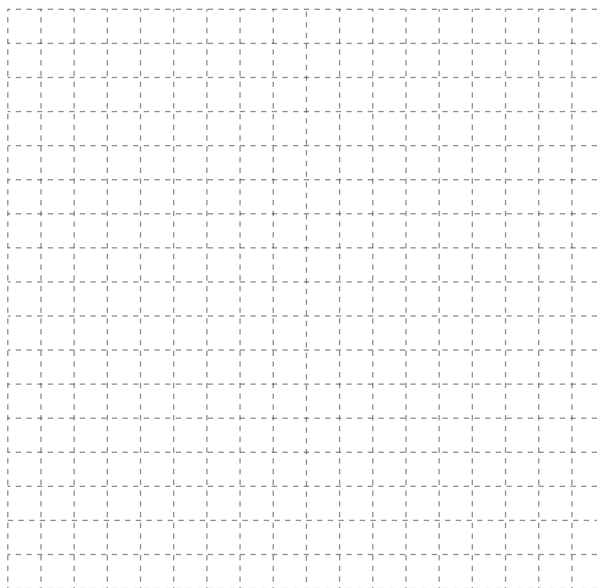
Use the following information to answer question 2.



2. a. What is the rate of change of line segment C ?
- 1 b. Which line segment represents the greatest rate of change? Explain
- 2 c. Which line segment represents no acceleration? How long does the motorcycle have zero acceleration?
- 2 d. Determine the domain and range of the relation.

- ③ 3. a. Determine the equation of a line, in slope-intercept form, that is perpendicular to $4x + 2y + 18 = 0$ and has a y -intercept identical to that of the line $3x - y + 8 = 0$.

- ② b. Graph the new line.



- ② c. State the equation of the new line, in general form.

Use the following information to answer question 4.

A 7% acid solution will be mixed with a 15% acid solution. 20 L of a 12% acid solution needs to be made.

- ① 4. a. Identify the two variables in the problem by completing the following statements:
- Let x represent: _____
- Let y represent: _____
- ② b. Use the variables defined in part a to create a system of linear equations that models the given situation.
- ③ c. How many litres of each solution are needed?
- ② d. Verify the solution.

END OF EXAM
Total Marks: 68

Mathematics 10C Formula Sheet

Measurement

Conversion Tables:

Linear
12 inches = 1 foot
3 feet = 1 yard
36 inches = 1 yard
1 760 yards = 1 mile

Mass
16 ounces = 1 pound
2000 pounds = 1 ton

Volume
2 cups = 1 pint
2 pints = 1 quart
4 quarts = 1 gallon

Prefix	Conversion Factor
kilo	0.001
hecto	0.01
deca	0.1
	1
deci	10
centi	100
milli	1 000

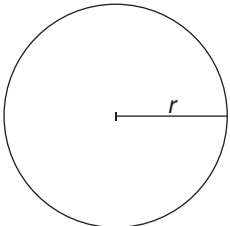
Capacity
1 imperial gallon = 4.546 litres
1 litre = 0.220 imperial gallons
1 US gallon = 3.79 litres
1 litre = 0.264 US gallons
1 cubic inch = 16.387 cubic centimetres
1 cubic centimetre = 0.061 cubic inches
1 cubic yard = 0.765 cubic metres
1 cubic metre = 1.308 cubic yards

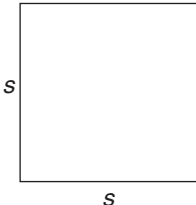
Length
1 inch = 2.54 centimetres
1 centimetre = 0.394 inches
1 foot = 0.305 metres
1 metre = 3.281 feet
1 yard = 0.914 metres
1 metre = 1.094 yards
1 mile = 1.609 kilometres
1 kilometre = 0.621 miles

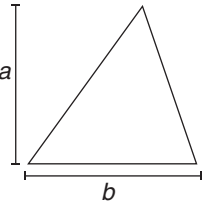
Mass
1 ounce = 28.350 grams
1 gram = 0.035 ounces
1 pound = 0.454 kilograms
1 kilogram = 2.205 pounds

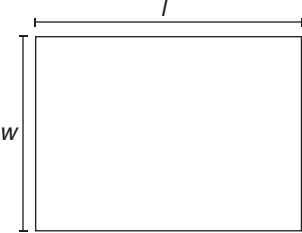
Surface Area and Volume

2-D Shapes:

Circle	
	$A_{\text{circle}} = \pi r^2$

Square	
	$A_{\text{square}} = s^2$

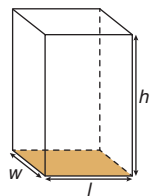
Triangle	
	$A_{\text{triangle}} = \frac{ab}{2}$

Rectangle	
	$A_{\text{rectangle}} = lw$

3-D Shapes:

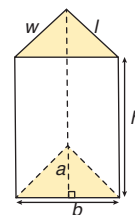
$$SA_{\text{right rectangular prism}} = 2lw + 2hw + 2lh$$

$$V_{\text{right rectangular prism}} = lwh$$



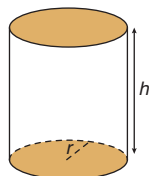
$$SA_{\text{right triangular prism}} = bh + lh + wh + ab$$

$$V_{\text{triangular prism}} = \frac{1}{2}abh$$



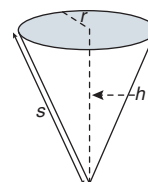
$$SA_{\text{right cylinder}} = 2\pi r^2 + 2\pi rh$$

$$V_{\text{right cylinder}} = \pi r^2 h$$



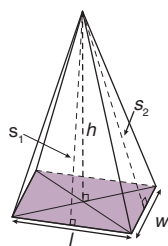
$$SA_{\text{cone}} = \pi r^2 + \pi rs$$

$$V_{\text{right cone}} = \frac{1}{3}\pi r^2 h$$



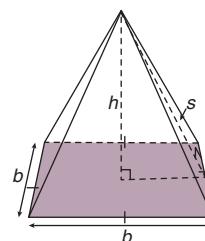
$$SA_{\text{right rectangular pyramid}} = lw + 2\left(\frac{ls_1}{2}\right) + 2\left(\frac{ws_2}{2}\right)$$

$$V_{\text{right pyramid}} = \frac{1}{3}lwh$$



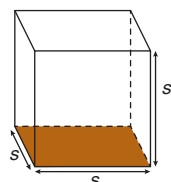
$$SA_{\text{right square pyramid}} = 4\left(\frac{sb}{2}\right) + b^2$$

$$V_{\text{right pyramid}} = \frac{1}{3}b^2 h$$



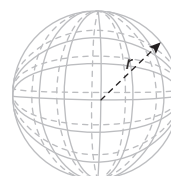
$$SA_{\text{cube}} = 6s^2$$

$$V_{\text{cube}} = s^3$$



$$SA_{\text{sphere}} = 4\pi r^2$$

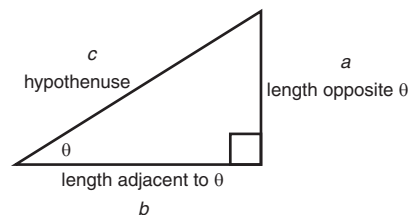
$$V_{\text{sphere}} = \frac{4}{3}\pi r^3$$



Trigonometry

Pythagorean Theorem:

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



Trigonometric Ratios:

$$\tan \theta = \frac{\text{length opposite } \theta}{\text{length adjacent to } \theta}$$

$$\cos \theta = \frac{\text{length adjacent to } \theta}{\text{hypotenuse}}$$

$$\sin \theta = \frac{\text{length opposite } \theta}{\text{hypotenuse}}$$

Linear Equations

Slope of Line:

$$m = \frac{\text{rise}}{\text{run}} \text{ or } m = \frac{y_2 - y_1}{x_2 - x_1}$$

Slope-Intercept Form:

$$y = mx + b$$

General Form:

$$Ax + By + C = 0$$

Slope-Point Form

$$y - y_1 = m(x - x_1)$$

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