

East Selkirk Middle School

Grade 9 Mathematics Exam

May 28, 2010

Student Response Booklet

Name :

Answer Key

Materials:

You will require the following materials:

- Calculator
- Ruler
- Pencil with eraser



Points To Remember

The total time allowed for writing this test is 120 minutes or 2 hours

- Work alone on this test
- You may use a calculator on any part of this test.
- Notes, notebooks or textbooks may not be used during the test.
- You may use blank scrap paper but it must be handed in at the end of the test. You may do rough work in this booklet.
- If you need more space to answer a question, you may use an extra page provided by your teacher. Write your name and the question number on any extra page used. Staple all pages into your booklet where your answer begins.

Description

Your grade 9 final exam consists of 3 parts:

Part	Description	Suggested Time	Marks
1	Multiple Choice	40 minutes	26
2	Constructed Response	80 minutes	87

Directions

Part 1 : Multiple Choice – Read each question carefully. Choose the best response and mark it on the **Answer Sheet** by shading in the letter of the appropriate bubble with your pencil.

Part 2 : Constructed Response – Provide complete, well-organized answers showing all your thinking. Remember to write neatly.

Part 1: Multiple Choice Questions: - Use your bubble sheet. Shade the letter of the best answer.

1) Which of the following repeated multiplication forms represents the area of a square with a side length of 2?

- a. 2×4 c. $2 \times 2 \times 2 \times 2$
b. 2×2 d. $2 \times 2 \times 2 \times 4$

2) Determine the volume of a cube that has a side length of 13 cm.

- a. 39 cm^2 c. 169 cm^2
b. 78 cm^3 d. 2197 cm^3

3) Express 2187 as a power of 3.

- a. 3×729 c. 7^3
b. 3^7 d. 729^3

4) Which power has the greatest value? -32^2 , 4^6 , $(-5)^4$, 2^{10}

- a. 2^{10} c. $(-5)^4$
b. 4^6 d. -32^2

5) What is the value of -4^6 ?

- a. -4096 c. 24
b. -24 d. 4096

6) Express $7^2 \times 7^4$ as a single power.

- a. 7^2 c. 7^6
b. 7^4 d. 7^8

7) Evaluate $\frac{7^6}{7^2}$.

- a. 7^2 c. 7^6
b. 7^4 d. 7^8

8) Evaluate $\left(\frac{2}{3}\right)^3 \times \left(\frac{2}{3}\right)^2$

a. $\frac{4}{9}$

c. $\frac{32}{243}$

b. $\frac{8}{27}$

d. $\frac{1024}{59049}$

9) When evaluating the expression $4^3 \div (8 - 9 \times 2)$, what is the last operation to be completed?

a. addition
b. brackets

c. division
d. exponent

10) Which number will make the statement true?

$0.625 > \frac{\square}{8}$

a. 4
b. 5

c. 6
d. 7

11) Determine the mixed number that falls between 1.2 and 1.3.

a. $1\frac{4}{5}$

c. $1\frac{1}{4}$

b. $1\frac{3}{4}$

d. $1\frac{1}{5}$

12) The waiters at a restaurant give 30% of their tips to the kitchen staff at the end of each shift. If a waiter collects \$42.50 in tips, how much does he take home at the end of his shift?

a. \$42.20
b. \$39.50

c. \$29.75
d. \$12.75

13) What is the side length of a square with an area of 196 m^2 ?

a. 9 m
 b. 14 m

c. 49 m
d. 98 m

14) How many terms are there in the polynomial $2c^2 + 3cd - 2d^2 + 5$?

- a. 2 b. 3 **c. 4** d. 12

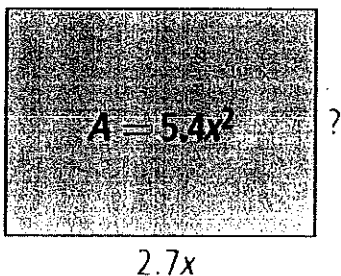
15) What is the degree of the polynomial $5g^2 + 2gh - h^2 + 7$?

- a. 1 **b. 2** c. 4 d. 7

16) Determine the product of $(2x)(3x)$.

- a. $6x$ c. $5x$
 b. $5x^2$ **d. $6x^2$**

17) Determine the missing dimension of the rectangle below.

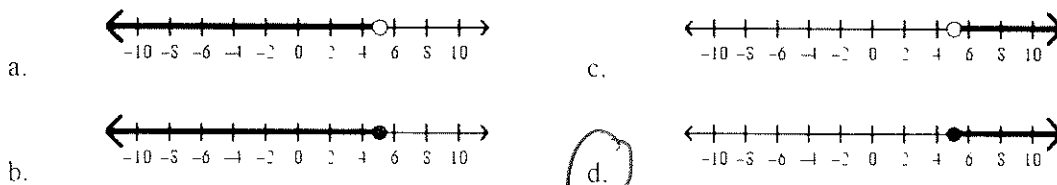


- a. $0.5x$ c. $2.7x^2$
b. $2x$ d. $14.58x^3$

18) Marc had 5 coupons for \$2.50 off the regular admission price of a movie. He bought tickets for himself and 4 friends. He paid \$42.25. The regular price for each ticket was:

- a. \$8.45 b. \$10.69 **c. \$10.95** d. \$12.50

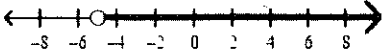
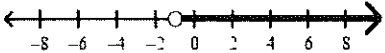
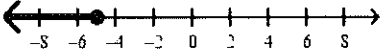

19) Which number line can represent the statement, "Only children at least 5 years old may swim in the wave pool"?



20) Determine a verbal representation of $3.4 \leq r < 8.2$.

- a. All numbers greater than or equal to 3.4 but less than 8.2.
- b. All numbers greater than or equal to 8.2 but less than 3.4.
- c. All numbers less than or equal to 3.4 but greater than 8.2.
- d. All numbers less than or equal to 8.2 but greater than 3.4.

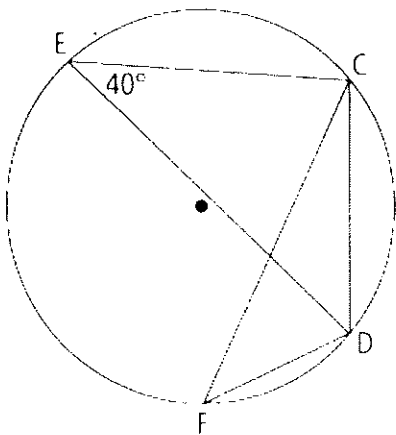
21) Which number line represents the solution to $t + 2 > -3$?

- a. 
- b. 
- c. 
- d. 

22) Which number is not a specific solution for the inequality $y - 2 \geq -4$?

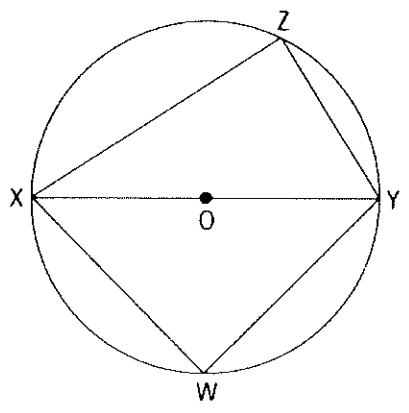
- a) -6
- b) -2
- c) 2
- d) 6

23) In the diagram, the measure of $\angle CFD$ is:



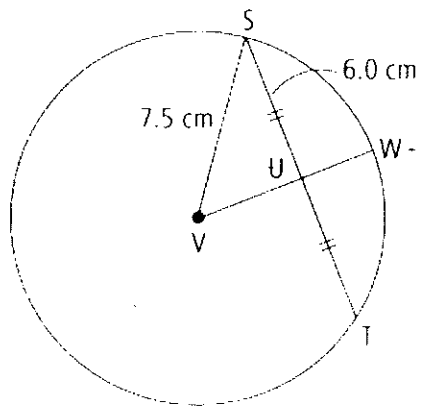
- a. 20°
- b. 40°
- c. 50°
- d. 80°

24) In the diagram, $\angle XWY$ is



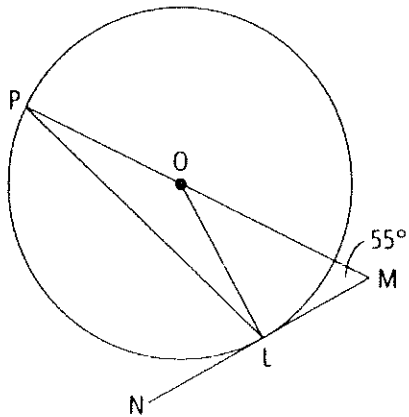
- a. equal to $\angle XZY$
- b. equal to half of $\angle XZY$
- c. equal to twice $\angle ZXW$
- d. equal to twice $\angle ZYW$

25) Determine the length of line UV in the figure shown below.



- a. 3.0 cm
- b. 4.5 cm
- c. 6.0 cm
- d. 9.6 cm

26) Determine the measure of $\angle LOM$.



- a. 15° **b. 35°** c. 75° d. 90°

END OF PART 1 - MULTIPLE CHOICE QUESTIONS

Part 2: Constructed Response - Remember to **show your work** in this section. Write neatly.

1) What is the value of $(8 + 4)^2 - (4^3 - 2^5) \div 4$?

$$\begin{aligned}
 &12^2 - (64 - 32) \div 4 \\
 &144 - 32 \div 4 \\
 &144 - 8 \\
 &\quad \mathbf{136}
 \end{aligned}$$

2 marks

2) What is the value of $\frac{4^3 + 2^4}{2^3 + 5}$?

$$\frac{64 + 16}{8 + 5}$$

$$\frac{80}{13} = \mathbf{6.15}$$

2 marks

1 mark

3) Evaluate $(3^2)^3$

$$= 3^6 = 729$$

1 mark

4) Write $(7^8)^0$ as a single exponent and evaluate.

$$7^0 = 1$$

6 marks

5) Evaluate.

a) $10 \times 4 + 6^3$

$$10 \times 4 + 216$$
$$40 + 216$$
$$256$$

b) $5 \times 2^5 - 6^2 \times 2$

$$5 \times 32 - 36 \times 2$$
$$160 - 72$$
$$88$$

c) $2 \times 5^3 \div (35 - 5^2)$

$$2 \times 125 \div (35 - 25)$$
$$2 \times 125 \div 10$$
$$250 \div 10$$
$$25$$

6) The number of insects in a colony doubles every month. There are currently 500 insects in the colony. How many insects will there be after one year?

$$500 \times 2^{12} = 2048000$$

2 marks

7) On a test, Laura completes the expression as shown. $4^3 \times 3^5 = 12^8$
Did Laura make a mistake? Justify your thinking.

Laura can't multiply the bases. Exponents can be added only if the bases are the same.
 $4^3 \times 3^5$ is already simplified.

2 marks

largest to smallest

8) Order the rational numbers in descending order.

$$1\frac{3}{8}, -3\frac{1}{3}, 1\frac{15}{16}, -1\frac{10}{11}$$

$$1.38, -3.33, -1.94, -1.91$$

$$1\frac{15}{16}, 1\frac{3}{8}, -1\frac{10}{11}, -3\frac{1}{3}$$

2 marks

9) What is $\left(\frac{6}{7} - \frac{1}{2}\right) \times \frac{14}{15}$?

$$\frac{12}{14} - \frac{7}{14}$$

$$= \frac{5}{14} \times \frac{14}{15} = \frac{1}{3}$$

2 marks

10) What is $\frac{2}{5} \times \left(\frac{2}{3} + \frac{1}{8}\right) \div \frac{8}{15}$?

$$\frac{16}{24} + \frac{3}{24} = \frac{19}{24}$$

$$\frac{12}{5} \times \frac{19}{24} = \frac{19}{10}$$

$$4 \frac{19}{60} \times \frac{15}{8} = \frac{19}{32}$$

3 marks

11) Jag has 4 large bags of popcorn, which he divides among some smaller bags. The smaller bags are $\frac{2}{3}$ of the size of the large bags. How many smaller bags of popcorn can Jag make?

$$4 \div \frac{2}{3}$$

$$\frac{24}{1} \times \frac{3}{2} = \frac{6}{1} = 6$$

2 marks

12) Jerry's bedroom is square. He has a square desk in his bedroom which has an area of 10 000 cm². The area of the bedroom is sixteen times the area of the desk. What is the side length of the bedroom?

$$10000 \times 16 = 160000 \text{ (area of bedroom)}$$

$$\sqrt{160000} = 400 \text{ cm}$$

2 marks

13) Tia travels from her home in Kelowna to visit a friend in Edmonton. The cost of a taxi from her home to the airport is \$15.00 each way. The cost of her round-trip flight is \$256.80. She stays at a hotel for three nights, at a cost of \$87.20 per night. How much does Tia spend, in total, on her trip?

$$\begin{array}{l}
 \text{Taxi} \quad 2 \times 15 = \$30 \\
 \text{Flight} \quad = \$256.80 \\
 \text{Hotel} \quad 3 \times 87.20 = 261.60 \\
 \hline
 \text{Total} = \boxed{\$548.40}
 \end{array}$$

2 marks

14) Evaluate each expression. Write your answer in lowest terms.

a) $2\frac{1}{4} \times 3\frac{1}{3}$

$$\begin{array}{l}
 3 \frac{9}{4} \times \frac{10^5}{31} = \frac{15}{2} \\
 \phantom{\frac{9}{4}} \phantom{\frac{10^5}{31}} = \boxed{7\frac{1}{2}}
 \end{array}$$

6 marks

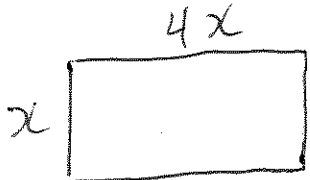
b) $-1\frac{3}{4} + 2\frac{1}{6}$

$$\begin{array}{l}
 -\frac{7}{4} + \frac{13}{6} \\
 \frac{-21}{12} + \frac{26}{12} \\
 \phantom{\frac{-21}{12}} + \frac{5}{12} = \boxed{\frac{5}{12}}
 \end{array}$$

c) $\frac{2}{5} + 1\frac{1}{15}$

$$\frac{2}{5} \times \frac{15^3}{168} = \boxed{\frac{3}{8}}$$

15) A rectangular swimming pool has a length that is four times its width. The pool covers an area of 144 m². What are the dimensions of the pool?



3 marks

$$\frac{4 \cdot x^2}{4} = \frac{144}{4}$$

$$\begin{array}{l}
 x^2 = 36 \\
 x = \sqrt{36} = 6
 \end{array}$$

Width = 6m
 Length = 4 × 6 = 24m

16) Determine if 64/100 is a perfect square. Explain.

It is a perfect square because both the numerator and denominator are perfect squares.

1 mark

17) Simplify

a) $(3a^2 + 2ab - 4) + (2a^2 - 5ab - 6)$

$$3a^2 + 2ab - 4 + 2a^2 - 5ab - 6$$

$$5a^2 - 3ab - 10$$

2 marks

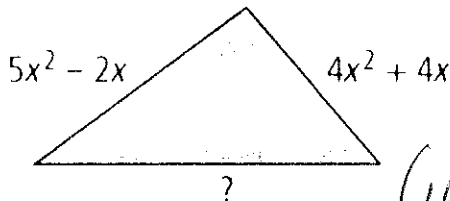
b) $(3m^2 - 4mn + 5) - (m^2 - 7mn - 2)$

$$3m^2 - 4mn + 5 - m^2 + 7mn + 2$$

$$2m^2 + 3mn + 7$$

2 marks

18) The perimeter of the triangle below can be represented by the polynomial $14x^2 + 8x$. What is the missing side length?



$$(5x^2 - 2x) + (4x^2 + 4x) = 9x^2 + 2x$$

$$(14x^2 + 8x) - (9x^2 + 2x) = 14x^2 + 8x - 9x^2 - 2x$$

$$5x^2 + 6x$$

2 marks

19) Peter, Paul and Mary sold candy kabobs at their school. Peter sold three times as many as Paul while Mary sold five less than Peter. If they sold 79 kabobs altogether, how many did each person sell? Write an equation and solve.

Pete $3x$

Paul x

Mary $3x - 5$

$$3x + x + 3x - 5 = 79$$

$$7x = 84$$

$$x = 12$$

Paul = 12

Pete = $3 \times 12 = 36$

Mary = $3 \times 12 - 5 = 31$

3 marks

20) Charlene's Lawn Care Service charges a flat fee of \$ 25 plus \$ 18 per hour.

2 marks

a) Write an expression to determine the total cost (C) of hiring Charlene.

$$C = 18h + 25$$

b) Use this expression to calculate how much Charlene would charge for 7.5 hours.

$$\begin{aligned} C &= 18 \cdot 7.5 + 25 \\ &= \$160 \end{aligned}$$

21) Simplify.

a) $(-6t)(-5t)$ $30T^2$

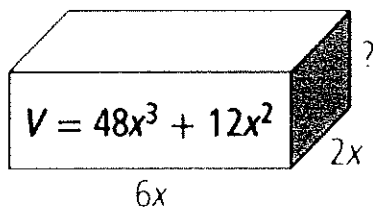
2 marks

b) $\frac{4.8t^2 - 7.2t + 24}{2.4}$ $2T^2 - 3T + 10$

c) $2x(x-4) - 3x(x-4)$ $2x^2 - 8x - 3x^2 + 12x$
 $-x^2 + 4x$

2 marks

22) Determine the height of the rectangular prism.



2 marks

$$h = \frac{V}{L \times W}$$

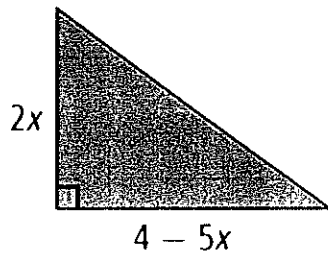
$$(6x)(2x) = 12x^2$$

$$\frac{48x^3 + 12x^2}{12x^2}$$

$$4x + 1$$

23) Write a simplified expression for the area of the triangle.

2 marks



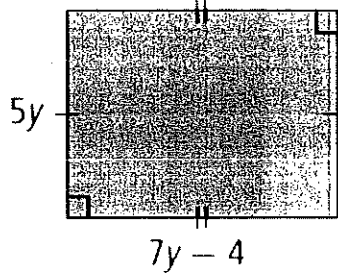
$$\frac{(2x)(4-5x)}{2}$$

$$\frac{8x - 10x^2}{2} = 4x - 5x^2$$

$$A = \frac{b \cdot h}{2}$$

24) Write a simplified expression for the perimeter of this figure. Calculate the perimeter of the figure?

2 marks

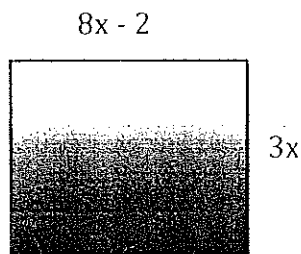


$$5y + 5y + 7y - 4 + 7y - 4$$

$$24y - 8$$

25) Write a simplified expression for the area of this rectangle. Calculate the area of the rectangle?

2 marks



$$A = L \times W$$

$$A = (3x)(8x - 2)$$

$$A = 24x^2 - 6x$$

26) Solve the following equations:

4 marks

a) $\frac{t}{1.6} + 5.9 = -3.2$
 $\frac{t}{1.6} - 5.9 = -5.9$

$$\frac{t}{1.6} = -9.1$$

$$t = -14.56$$

b) $2.6 + 2.1k = 1.5 + 4.3k$
 $-4.3k \quad -4.3k$

$$-2.6 - 2.2k = 1.5$$

$$-2.6 \quad -2.6$$

$$-2.2k = -1.1$$

$$-2.2 \quad -2.2$$

$$k = 0.5$$

$$c) \frac{6m - 3}{5} = \frac{4m - 1}{3}$$

$$18m - 9 = 20m - 5$$

$$-20m \quad -20m$$

$$-2m - 9 = -5$$

$$+9 \quad +9$$

$$-2m = 4$$

$$\frac{-2m}{-2} = \frac{4}{-2}$$

$$m = -2$$

4 marks

$$d) 5(x + 3) = 2(4x - 3)$$

$$5x + 15 = 8x - 6$$

$$-8x \quad -8x$$

$$-3x + 15 = -6$$

$$-15 \quad -15$$

$$-3x = -21$$

$$\frac{-3x}{-3} = \frac{-21}{-3}$$

$$x = 7$$

27) Susan charges a flat rate of \$20 per night of babysitting. She also charges an extra fee of \$3 per hour for every hour she works past 8 p.m. If Susan received \$32 for a night of babysitting, how late did she work?

$$3h + 20 = 32$$

$$-20 \quad -20$$

$$8 + 4 = 12$$

midnight

$$\frac{3}{3}h = \frac{12}{3}$$

$$h = 4$$

2 marks

28) Video club members pay an annual membership fee of \$25.00, which allows them to rent movies for \$3.50 instead of \$5.00. What is the least number of videos that a club member must rent during a year to save money from the membership? Write an equation and solve.

$$3.50x + 25 = 5x$$

$$-3.50x \quad -3.50x$$

$$\frac{25}{1.50} = \frac{1.50x}{1.50}$$

$$x = 16.67$$

The least number of videos is 17

3 marks

29) "On-the-Go Mobile Phones" charges a monthly service fee of \$9.52 plus a rate of 5¢ per minute. "Connect Mobile" charges 3¢ per minute plus a monthly service fee of \$11.60. After how many minutes will the monthly charge be the same for both companies? Write an equation and solve.

$$0.05m + 9.52 = 0.03m + 11.60$$

$$-0.03m \quad -0.03m$$

$$0.02m + 9.52 = 11.60$$

$$-9.52 \quad -9.52$$

$$\frac{0.02m}{0.02} = \frac{2.08}{0.02}$$

$$m = 104$$

3 marks

30) The number line below represents the inequality $x \geq -4$.



1 mark

31) Solve the following inequalities:

a) $\frac{(x+2)}{3} > \frac{2}{1}$ *Cross multiply*

$$x + 2 > 6$$

$$-2 \quad -2$$

$$x > 4$$

4 marks

b) $4(r-1) < 8r+20$

$$4r - 4 < 8r + 20$$

$$-4r \quad -4r$$

$$-4 < 4r + 20$$

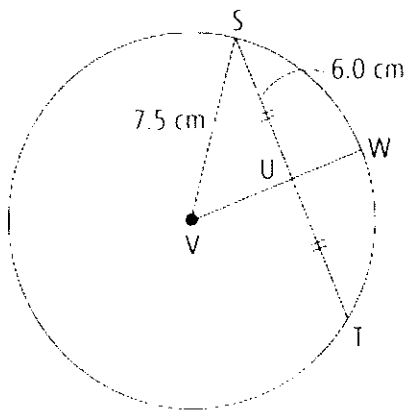
$$-20 \quad -20$$

$$\frac{-24}{4} < \frac{4r}{4} \quad -6 < r$$

OR

$$r > -6$$

32) In the figure shown, what is the measure of $\angle SUV$? Explain how you know.



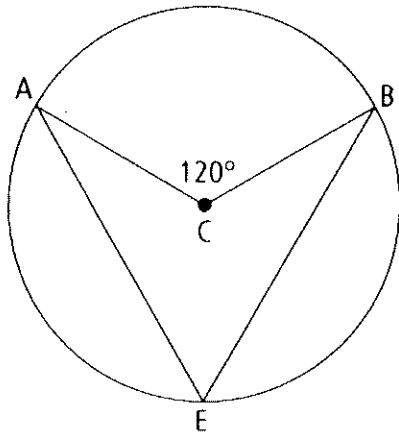
2 marks

VW bisects chord ST.
(cuts in half)

When this happens, ST
is perpendicular to VW

$$\angle SUV = 90^\circ$$

33) Without using a protractor, what is the measure of $\angle AEB$ in the figure below? Explain how you know.



2 marks

$\angle AEB$ and $\angle ACB$ share the same endpoints.

$\angle AEB$ is called an inscribed angle while $\angle ACB$ is a central angle.

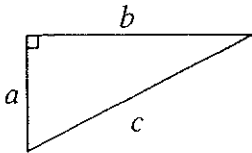
Central angles are twice the size of inscribed angles.

$$\angle AEB = \frac{120}{2} = 60^\circ$$

End of the Grade 9 Math Exam

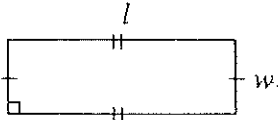
FORMULAS

Pythagorean Theorem



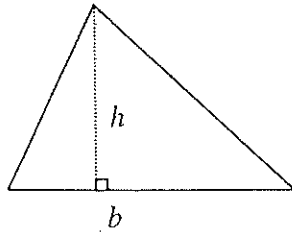
$$a^2 + b^2 = c^2$$

rectangle



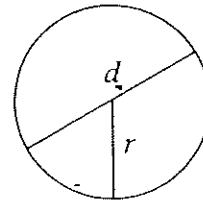
$$A = lw$$
$$P = 2l + 2w$$

triangle

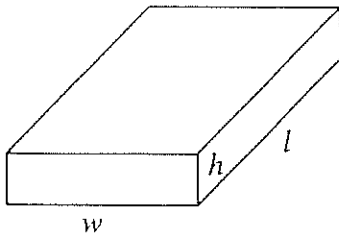


$$A = \frac{bh}{2}$$

circle



$$A = \pi r^2$$
$$C = 2\pi r \quad C = \pi d$$



$$\text{Volume} = lwh$$

Surface Area = Total area of all faces of a 3-D object.

