

## Grade 8 Math Exam Review

Name: \_\_\_\_\_

The grade 8 math exam is scheduled for Thursday, June 18<sup>th</sup> (am). You will write the exam in your homeroom. You will attend your regular classes in the afternoon.

A good study strategy is to:

1. Review notes and examples on each target.
2. Review quizzes and test on that target.
3. Complete the questions on that target. Then
4. Get feedback (answers) for those questions.

We will also be reviewing the units below in class as well as we prepare for the exam. During our in class review we will be supplementing this package with additional questions.

We have a good chunk of time to prepare for this exam. It is important to give a solid effort during exam preparation for this exam not just so you get a good mark in grade 8, but also so you have a strong foundation to build on through high school mathematics.

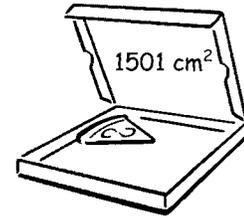
As you prepare for the exam, keep track of specific questions you may have pertaining to notes given in class or quizzes or tests or exam review questions so you can ask in class.

Unit
Unit 1: Square Roots and The Pythagorean Theorem
Unit 2: Operations on Fractions
Unit 3: Percent Ratio Rate
Unit 4: Operations on Integers
Unit 5: Linear Equations and Graphing
Unit 6: Surface Area of Prisms and Cylinders

# UNIT 1: Square Roots and The Pythagorean Theorem

1. A pizza box has a square top. The area of the top is  $1501 \text{ cm}^2$ . Calculate the length of the side of the box to a tenth of a centimetre.

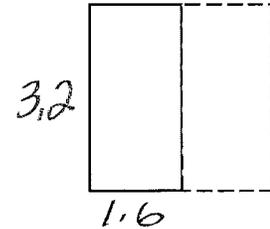
$$\sqrt{1501} = 38.7 \text{ cm}$$



2. This rectangle is half of a square. If the square has an area of  $10.24 \text{ cm}^2$ , what are the side lengths of the rectangle?

$$\sqrt{10.24} = 3.2$$

The rectangle is  $3.2 \times 1.6$



3. A mall has an area of  $5632 \text{ m}^2$ . It is divided into 22 equal square shaped stores. What are the dimensions of each store?

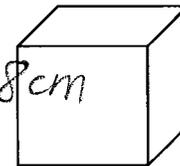
$$\sqrt{256} = 16 \text{ m} \text{ Each store is } 16 \text{ m} \times 16 \text{ m}$$

4. A cube has a surface area of  $384 \text{ cm}^2$ . What are the dimensions of the cube?

$$6\sqrt{384} = 64$$

$$\sqrt{64} = 8$$

The cube is  $8 \text{ cm} \times 8 \text{ cm} \times 8 \text{ cm}$



5. Farmer Joe wants to make a vegetable garden in the corner of his yard, but has a terrible rabbit problem. He decides to surround his garden with chicken wire in hopes of preventing the rabbits from eating all of his vegetables. How much chicken wire does Farmer Joe need in order to enclose his vegetable garden?

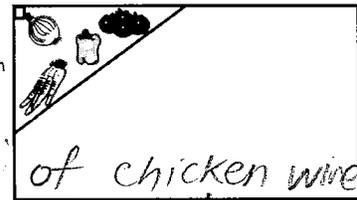
$$5^2 + 6^2 = c^2$$

$$25 + 36$$

$$61 = c^2$$

$$c = \sqrt{61} = 7.8 \text{ m}$$

$$5 + 6 + 7.8 = 18.8 \text{ m}$$



of chicken wire is required.

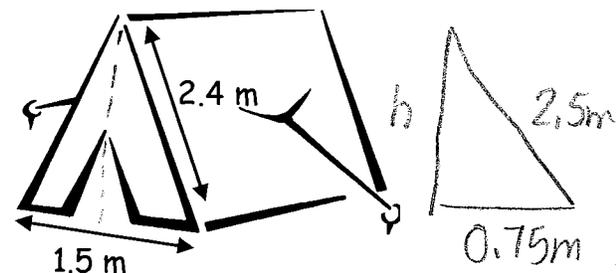
6. The Outdoor Ed class is going camping for Lifeweek and Mr. Filewich is joining the group. The tent available for Mr. Filewich has the dimensions shown in the picture below. If Mr. Filewich is  $2.08 \text{ m}$  tall, will he be able to stand up straight in the tent? Explain.

$$h^2 = 2.5^2 - 0.75^2$$

$$= 6.25 - 0.5625$$

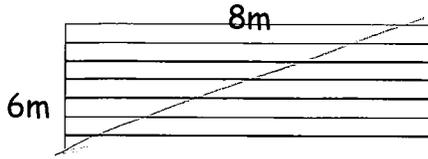
$$h^2 = 5.6875$$

$$h = 2.38 \text{ m}$$



Yes he will have  $0.3 \text{ m}$  clearance in the tallest part of the tent.

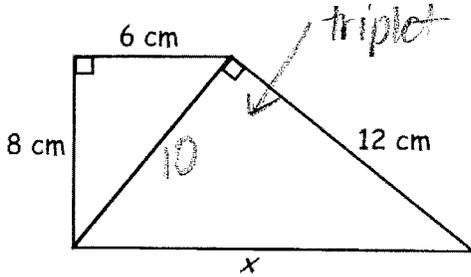
7. A carpenter is building a 6 m by 8 m rectangular deck. Without using a carpenter's square or angle measurement, how can the carpenter verify that the rectangle has square corners?



By applying Pythagorean Theorem, if he measures the diagonal (hypotenuse) it should measure 10m if the corners are straight.



8. What is the length of  $x$  to the nearest tenth of a centimeter?



$$10^2 + 12^2 = x^2$$

$$100 + 144 = 244$$

$$\sqrt{244} = 15.6 \text{ cm}$$

## UNIT 2: Operations with Fractions

1. For dessert, Joni's family ate  $\frac{1}{3}$  of a blue berry pie and some apple pie. If they ate  $1\frac{1}{12}$  pies in all, what fraction of the apple pie did they eat?  $\frac{1}{3} + x = 1\frac{1}{12}$

$$\frac{13}{12} - \frac{4}{12} = \frac{9}{12} = \frac{3}{4} \text{ of an apple pie was eaten.}$$

2. Two-thirds of the school yard was covered in grass. The parent council planned to replace one-quarter of the grass with a baseball diamond. How much of the school yard will the baseball diamond occupy?

$$\frac{2}{3} \times \frac{1}{4} = \frac{2}{12} = \frac{1}{6}$$

3. Ken typed one-third of his story on the computer in 30 minutes. How many hours did it take him to complete the whole story?  $\frac{1}{2} \div \frac{1}{3} = \frac{1}{2} \times \frac{3}{1} = 1\frac{1}{2} \text{ hours}$

4. Explain the error made by this student and demonstrate how to find the correct answer.

$$\begin{aligned} & 5\frac{2}{8} \times \frac{10}{5} \\ &= \frac{18}{8} \times \frac{10}{5} \\ &= \frac{180}{40} \\ &= 4\frac{1}{2} \end{aligned}$$

need to multiply the denominator by whole # not numerator

$$5\frac{2}{8} \times \frac{10}{5}$$

$$\frac{42}{8} \times \frac{10}{5} = \frac{42}{8} \times \frac{2}{1} = \frac{42}{4} = 10\frac{1}{2}$$

5. Mr. Simpson's gas tank was seven-eighths full when he left home. He used three-fourths of a tank of gas on his errands. What fraction of the tank of gas was left? Show how you got your answer.

$$\frac{7}{8} - \frac{3}{4} \Rightarrow \frac{7}{8} - \frac{6}{8} = \frac{1}{8} \text{ left}$$

- \* 6. Elena spends half of her money buying a ticket at the school dance. From one-third of the money she has left, she buys herself a piece of pizza and a soft drink. When she gets home, she has \$4.50. How much money did Elena have when she went to the dance?

$$x - \frac{1}{2}x - \frac{1}{3}\left(\frac{1}{2}\right)x = 4.50$$

$$x - \frac{1}{2}x - \frac{1}{6}x = 4.50 \Rightarrow \frac{1}{3}x = 4.50 \quad (x = 13.50)$$

7. Explain the error made by this student and demonstrate how to find the correct answer.

$$2\frac{7}{8} \div 1\frac{2}{3}$$

$$= 2\frac{7}{8} \times 1\frac{3}{2}$$

$$= \frac{23}{8} \times \frac{5}{2}$$

$$= \frac{115}{16}$$

$$= 7\frac{3}{16}$$

$$2\frac{7}{8} \div 1\frac{2}{3}$$

$$\frac{23}{8} \div \frac{5}{3}$$

$$\frac{23}{8} \times \frac{3}{5} = \frac{69}{40} = 1\frac{29}{40}$$

8. Write three multiplication statements that have a product of  $\frac{3}{4}$

9. Complete each statement with the fraction that makes each statement true.

a)  $\frac{3}{8} \times \boxed{\frac{1}{4}} = \frac{3}{32}$

$$\frac{3}{32} \times \frac{8}{3} = \frac{1}{4}$$

b)  $\frac{4}{9} \div \boxed{\frac{7}{8}} = \frac{32}{63}$

$$\frac{4}{9} \div \frac{32}{63} \Rightarrow \frac{14}{19} \times \frac{637}{328} = \frac{7}{8}$$

c)  $\boxed{1\frac{3}{5}} \times 1\frac{2}{3} = \frac{8}{3}$

$$\frac{8}{3} \div \frac{5}{3} \Rightarrow \frac{8}{3} \times \frac{3}{5} = \frac{8}{5} = 1\frac{3}{5}$$

d)  $\boxed{1\frac{1}{6}} \div \frac{7}{4} = 1\frac{5}{21}$

$$1\frac{5}{21} \times \frac{7}{4} = \frac{13}{6} = 2\frac{1}{6}$$

Ch:  $\frac{8}{5} \times \frac{8}{3} = \frac{8}{3}$

10. Copy then evaluate each result in simplest terms.

a)  $16 \times \frac{3}{5} - \frac{8}{9}$

$\frac{48}{5} - \frac{8}{9} = \frac{432}{45} - \frac{40}{45} = \frac{392}{45} = 8\frac{32}{45}$

b)  $3\frac{2}{5} \times (2\frac{1}{2} + 2\frac{1}{4})$

$\frac{17}{5} \times \frac{19}{4} = \frac{323}{20}$   
 $3\frac{2}{5} \times 4\frac{3}{4} = 16\frac{3}{20}$

c)  $8\frac{1}{3} - \frac{8}{3} \div \frac{1}{2}$

$\frac{25}{3} - \frac{8}{3} \times \frac{2}{1} = \frac{25}{3} - \frac{16}{3} = \frac{9}{3} = 3$

d)  $\frac{4}{5} \div \frac{5}{4} \times \frac{4}{5} \div \frac{5}{4}$

$\frac{4}{5} \times \frac{4}{5} \times \frac{4}{5} \times \frac{4}{5} = \frac{256}{625}$

**UNIT 3: Percent, Ratio and Rate**

1. At birth, Canadians have a life expectancy of about 77 years. A beaver has a life expectancy of about 5 years. What percent of a human's life expectancy is a beaver's life expectancy?

$\frac{5}{77} = 0.065 \rightarrow 6.5\%$  A beaver's life expectancy is 6.5% of a human's.

2. During a real estate boom, the price of a house rose from \$200 000 to \$585 000 over ten years. What percent of the original price is represented by the increase in value?

$\frac{\$385000}{\$200000} = 1.925 \Rightarrow 192.5\%$  increase in value.

3. In 1966, a new car cost \$4000. In 1996, a similar sized car cost \$26 000. Express the increase in price over the 30 years as a percentage.

$\frac{22000}{4000} = 5.5 \Rightarrow 550\%$  increase

4. The cost of an iPad is \$519.00. It is on sale until July 15<sup>th</sup> for 27% off the regular price. Calculate the cost of the iPad with the discount and PST and GST.

Pay 73%  $73\% \text{ of } 519 = \$378.87$   $378.87 \times 1.12 \text{ for PST+GST} = \$424.33$  including GST+PST.

5. Brooke answered this question on a test:

A sweater originally priced at \$60 was on sale for \$45.

What was the percent decrease for the sweater?

The sweater was on sale for 25% off.

Brooke solved the problem and her answer is shown below:

$\frac{45}{60} = \frac{3}{4} \Rightarrow 75\%$  of original price

$60 - 45 = 15$

$\frac{15}{45} = 0.33$

The sweater was on sale for 33% off the regular price.

Is Brooke correct? Explain how you know. If she is not correct, show how to correctly solve this problem.

NO, she needed to compare the discounted amount to the original price.

6. In the recent Science Olympics, there were 20 questions for competitors to answer. For every correct answer, students received 1.25 marks, and for every incorrect answer, they lost 0.5 marks.

a) Calculate the percent scores for these teams.

Teams	Da' Atom Bomb	The Dissectors	Viscose Villians	Sheldon Cooper
# of correct questions	15 correct	10 correct <u>18.5</u>	12 correct	20 correct

20

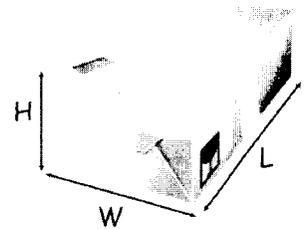
b) Is a score of 125% possible? Explain. *Yes if they got 20 correct -*

7. At Jack Frost's Ice Cream Parlour, the ratio of vanilla to chocolate to strawberry ice cream cones sold is about 3 : 5 : 4. One week, customers bought 250 chocolate cones. How many vanilla and strawberry cones were sold? *3 : 5 : 4 x 5*  
*150 vanilla, 200 strawberry* *150 : 250 : 200*
8. The ratio of length to width to height of a box is 4 : 1 : 2.

a) If the height of the box is 25 cm, what are the other dimensions?

*l w h*  
*4 : 1 : 2*  
*50 : 12.5 : 25*

*l = 50 cm*  
*w = 12.5 cm*  
*h = 25 cm*



9. Which is the best buy? Show how you know.

*Find cost/L*

12 cans of Pepsi for \$3.99 or One bottle of Pepsi for \$1.79



*12 x 355 mL*  
*4260 mL ÷ 1000 mL/L*  
*= 4.260 L*



*\$3.99*  
*4.260 L*  
*= 0.937 → \$0.94/L*  
*↓*  
*94¢/L*

*\$1.79*  
*2 L*  
*= \$0.895/L*  
*↓*  
*90¢/L*

*The 2L bottle is a better buy.*

## UNIT 5: Linear Equations and Graphing

1. Make a table of values for the relation  $y = 2x - 7$  for integer values of  $x$  from -3 to 3.

$x$	-3	-2	-1	0	1	2	3
$y$	-13	-11	-9	-7	-5	-3	-1

- a) What is the value of  $y$  when  $x = 7$ ?  $2(7) - 7 = 14 - 7 = 7$   
 b) What is the value of  $x$  when  $y = 7$ ?  $7 = 2(x) - 7$   $\frac{14}{2} = \frac{2x}{2}$   $x = 7$   
 c) Estimate the value of  $y$  when  $x = 1.5$ ?

$$y = 3 - 7 = 4$$

2. Make a table of values for the relations  $y = x + 3$  and  $y = 2x - 4$ .

$x$	$x+3$
1	4
2	5
3	6
4	7
5	8
6	9
7	10

$x$	$2x-4$
1	-2
2	0
3	2
4	4
5	6
6	8
7	10

For what value of  $x$  will the relations have the same  $y$ -value?

$$x + 3 = 2x - 4$$

$$-x = -x$$

$$4 + 3 = x - 4 + 4$$

$$x = 7$$

3. The equation of a linear relation is:  $y = -3x + 8$ .

Which ordered pairs are NOT in the relation? Show how you know.

~~A(3, -1)~~, ~~B(7, -13)~~, ~~C(8, -16)~~, D(9, -20)

$$-9 + 8 = -1$$

$$-21 + 8 = -13$$

$$-24 + 8 = -16$$

$$-27 + 8 = -19$$

4. The price of a medium pizza is \$15, plus \$3 for each topping.

An equation for this relation is:  $c = 15 + 3t$ , where  $t$  represents the number of toppings and  $c$  represents the cost of the pizza in dollars.

- a) Complete this table of values for the relation.

Number of Toppings, $t$	0	2	4	6	8
Cost, $c$ (\$)	15	21	27	33	39

- b) What is the cost of a pizza with 7 toppings?

$$c = 15 + 3(7)$$

$$= 15 + 21$$

$$= 36$$

The cost for a pizza w 7 toppings is \$36

## UNIT 4: Operations on Integers

1. Evaluate.

a)  $(-6) \times (+2) \times (-4) =$   
 $-12 \times -4 = +48$

b)  $(-1) \times (-1) \times (-1) =$   $-1$   
 $+1 \times -1 =$

c)  $(-64) \div (+2) \div (-4) =$   
 $-32 \div -4 = +8$

d)  $(+25) \div (-5) \times (-2) =$   
 $-5 \times -2 = +10$

2. Use these integers  $\{0, -2, +3, -1, +1, -3, +5\}$  to answer the following questions:

a) Which two sets of integers have a quotient of  $-3$ ?  $\rightarrow \div$   $(+3) \div (-1)$   
 $(-3) \div (+1)$

b) Which two integers have the greatest product?  $(+3)(+5) = +15$

c) Which three integers have the greatest product?  $(-2)(-3)(+5) = (+6)(5) = +30$

d) Which two integers have the least sum?  $(-3) + (-2) = -5$

e) Which two integers have a quotient less than  $-3$ ?

3. A student answered this question:  $(+5) \div (-1) = -5$

Explain the error made by the student and show how to correctly answer this question.

$$\begin{aligned} \frac{(-9) - (+2)}{-12 \div +6} \times 8 + (-4) &= \frac{(-11)(8) + (-4)}{-2} \\ &= \frac{(-88) + (-4)}{-2} \\ &= \frac{-92}{-2} = +46 \end{aligned}$$

need to multiply before adding  $-4$ .

$$\begin{aligned} &\frac{[(-9) - (+2)] \times 8 + (-4)}{(-12) \div (+6)} \\ &= \frac{(-11) \times 4}{-2} \\ &= \frac{-44}{-2} \\ &= 22 \end{aligned}$$

4. Use only these integers:  $-9, -5, -2, 1, 3$  to replace each  $*$  in the expression below to get a value of  $(-24)$ . Each integer can only be used once.

$$\begin{array}{ccccccc} -9 & 3 & -2 & 1 & -5 & & \\ (*) & (*) & + & \div & (*) & - & (*) \\ -27 & -2 & -2 & 1 & -5 & & \\ & & & & & & -27 + -2 - (-5) \\ & & & & & & -29 + 5 \\ & & & & & & -24 \end{array}$$

5. Complete each  $\square$  with the correct operation  $(+, -, \times, \div)$  to make each equation true.

a)  $(-3) \square (+5) \square (+1) = -14$   
 $-15 + 1 = -14$

b)  $(-5) \square (-2) \square (+4) = 1$   
 $-3 + 4 = +1$

c)  $(-4) \square (-24) \square (-6) = 0$   
 $-4 + 4 = 0$

5. a) Graph each relation for integer values of  $x$  from  $-3$  to  $3$ .

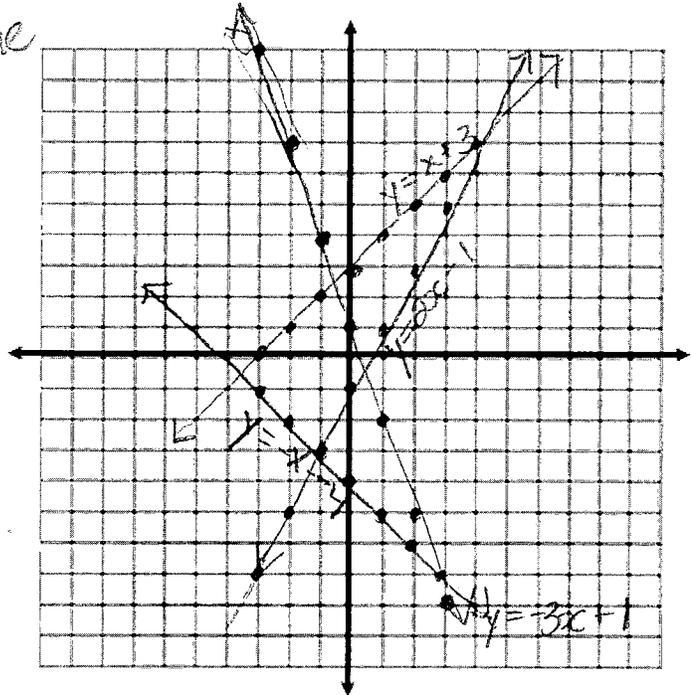
i)  $y = x + 3$

ii)  $y = 2x - 1$

iii)  $y = -3x + 1$

iv)  $y = -x - 4$

} go up to the right  
 ] go down to the right



b) Which graphs go up to the right? Which graphs go down to the right?

c) How can you use the equation of a linear relation to tell if its graph goes up or goes down to the right? The coefficient in front of the  $x$ .

If the coefficient is negative it slopes down.

If the coefficient is +ve it slopes up.

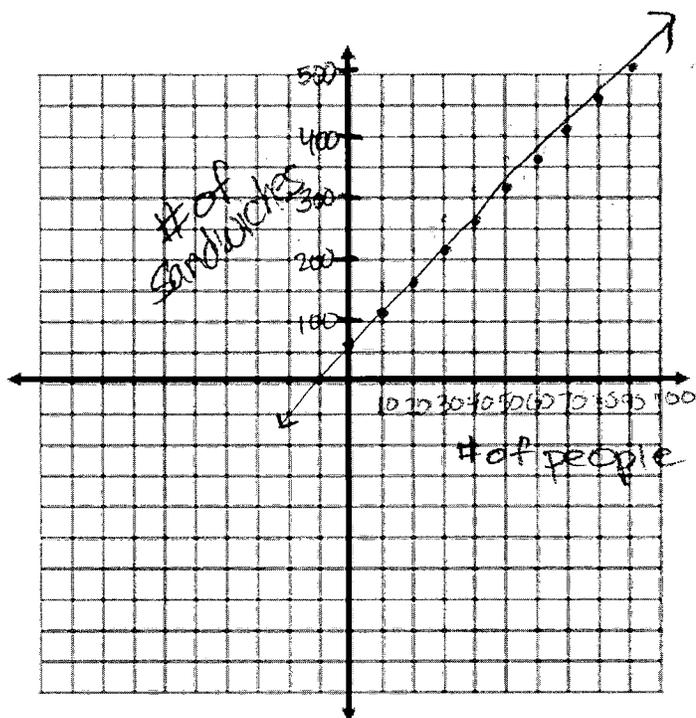
6. Bernadette is making sandwiches for a party. She estimates 5 sandwiches per person, plus 60 extras.

An equation for this relation is:  $t = 5p + 60$ , where  $p$  represents the number of people and  $t$  represents the total number of sandwiches made.

a) Make a table of values for  $p = 0, 10, 20, 30, 40,$  and  $50$ .

$p$	0	10	20	30	40	50
$t$	60	110	160	210	260	310

b) Graph the relation.



c) How many sandwiches are required for 100 people?

$$5(100) + 60 = 500 + 60 = 560 \text{ sandwiches}$$

7. a) Solve each and verify each equation. Show your steps.

a)  $-3x + 5 = 20$

ch:  $(-3)(-5) = 15 + 5 = 20$

$$\begin{aligned} -3x + 5 &= 20 \\ -3x &= 15 \\ x &= -5 \end{aligned}$$

b)  $-2(4x - 1) = 26$

ch:  $-2(-12 - 1) = -2(-13) = 26$

$$\begin{aligned} -2(4x - 1) &= 26 \\ 4x - 1 &= -13 \\ 4x &= -12 \\ x &= -3 \end{aligned}$$

8.  $\frac{x}{3} + \square = 10$

Replace the box with a number so that x will have a value of 12.

Verify your solution.

$$\frac{12}{3} + \square = 10 \Rightarrow 4 + \square = 10 \Rightarrow \square = 6$$

9. Jack was asked to simplify this expression on a test.

His work is shown below:

$$\begin{aligned} &3 + 6(12 - x) \\ &= 9(12 - x) \\ &= 108 - 9x \end{aligned}$$

Explain Jack's mistake and show the correct simplification.

$$\begin{aligned} &3 + 6(12 - x) \\ &= 3 + 72 - 6x \\ &= 75 - 6x \end{aligned}$$

Needs to expand into the brackets before adding.

10. Jill used the distributive property to solve this equation:  $4(-x + 3) = 19$

a) Explain the two mistakes that Jill made.

$$4(-x + 3) = 19$$

$$-4x + 12 = 19$$

$$-4x = \frac{7}{-4}$$

$$x = \frac{7}{4}$$

Jill's solution: *- did not distribute to both parts of the brackets*

$$4(-x + 3) = 19$$

$$4x + 3 - 3 = 19 - 3$$

$$-4x = 16$$

$$x = 4$$

*- Dropped the negative while distributing.*

b) Show how to correctly solve this equation.

see above

11. Without solving the equation, show which value, 4, 6, or 8, is the correct solution to

the equation  $\frac{x}{3} - 7 = -5$ . Explain.

$$\frac{4}{3} - 7 \neq -5$$

$$\frac{6}{3} - 7 = -5$$

$$\frac{8}{3} - 7 \neq -5$$

$$2 - 7 = -5$$

12. Write an equation for each sentence, then solve the equation.

a) "When 7 is subtracted from a number divided by 3, the result is 14."  $\frac{n}{3} - 7 = 14$

b) "A number multiplied by -3 is added to 5 and the result is -16."

$$-3n + 5 = -16$$

13. You are a member of the Famous Players Movie Points Club. Every time you see a movie, you earn two points. When you earn 100 points, you get a free movie ticket.

Right now you have 64 advantage points.

let  $m =$  movie

$m \rightarrow 2$  points/movie

a) Write an equation to show the number of movies you have to watch before you earn a free movie ticket.

$$64 + 2m = 100$$

b) Solve the equation.

$$-64 \quad -64$$

$$\frac{2m}{2} = \frac{36}{2}$$

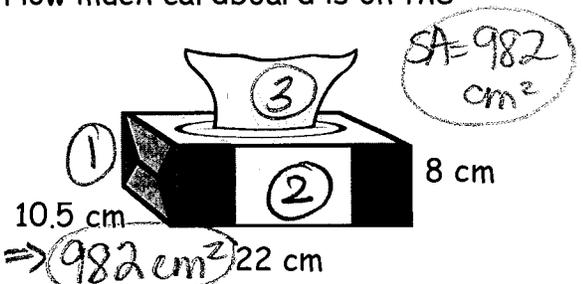
$$m = 18$$

You would have to watch 18 movies to earn a free ticket.

## UNIT 4: Surface Area of Prisms and Cylinders

1. A box of facial tissues is 22 cm by 10.5 cm by 8 cm. How much cardboard is on the outside surface?

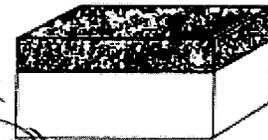
$$SA = \begin{array}{l} \textcircled{1} 10.5 \times 8 = 84 \text{ cm}^2 \\ \textcircled{2} 22 \times 8 = 176 \text{ cm}^2 \\ \textcircled{3} 22 \times 10.5 = 231 \text{ cm}^2 \\ \hline 491 \text{ cm}^2 \Rightarrow \times 2 \Rightarrow 982 \text{ cm}^2 \end{array}$$



2. A storage box is 60 cm long, 45 cm wide and 30 cm high. The lid is 10 cm high. What is the surface area of the box and its lid?

SA of box + lid when closed = SA of box

$$\begin{array}{l} \text{side 1} = 60 \times 45 \text{ (l} \times \text{w)} = 2700 \\ \text{side 2} = 45 \times 30 \text{ (w} \times \text{h)} = 1350 \\ \text{side 3} = 60 \times 30 \text{ (l} \times \text{h)} = 1800 \\ \hline 5850 \end{array} \Rightarrow 11700 \text{ cm}^2$$



3. The height of a paint can is 12.5 cm. The diameter of the base is 10.5 cm.  
radius = 5.25

a) What is the surface area of the can, including the lid?  
SA top + bottom  $\Rightarrow 2(5.25)^2 \pi = 173.18 \text{ cm}^2$

Lateral =  $\pi d h$   
 $= (10.5)(12.5)(\pi)$   
 $= 412.33 \text{ cm}^2$

Total SA =  $412.33 + 173.18 = 585.5 \text{ cm}^2$



- b) How much will it cost the manufacturer to make the can and lid if metal costs 0.02¢ for each square centimeter?

$$585.5 \times 0.02 \text{¢} = 11.7 \text{¢/can}$$

4. The open ends of a pup tent are isosceles triangles with a base of 1.5 m and a height of 1 m. The length of the tent is 2 m. How much material do you need to construct the tent?

$$A_T = \frac{(1.5)(1)}{2} = 0.75 \text{ m}^2 \Rightarrow 2 \Delta's = 1.5 \text{ m}^2$$

$$A_{\text{sides}} = (1.25)(2) \Rightarrow 2.50 \text{ m}^2 \times 2 \text{ sides} = 5 \text{ m}^2$$

$$A_{\text{base}} = (1.5)(2) = 3 \text{ m}^2$$

Total SA =  $1.5 + 5 + 3 = 9.5 \text{ m}^2$  of material is required.

