HOMEWORK DEPOT STUDY SHEETS

Math 8 Principles

This study sheet provides a general review of all topics in the BC Math 8 Principles curriculum. For an extensive online lesson of each topic, visit www.BCMath.ca

Number Sense:

Multiplication & Division Chart

When multiplying/dividing two integers, two negatives becomes a positive. One negative & one positive become a negative.

$(+)\times(+)$	+
$(+)\times(-)$	−
$(-)\times(+)$	−
$(-)\times(-)$	+

$ie: (-3)\times(2) = -6$

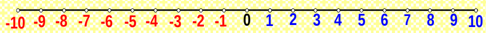
$(15)\div(-3) = -5$

$(-21)\div(-7) = 3$

$(-3)(-7)(-2) = -42$

Adding/Subtracting Negative Numbers

Note: Use number line:



1st number is where you start

2nd number is which way you go.

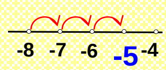
$(-\text{'ve}) \Rightarrow Left \quad (+\text{'ve}) \Rightarrow Right$

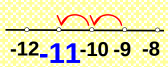
3rd Use multiplication chart to resolve the sign in the middle.

ie: $5-(-3) \Rightarrow 5+3$, $-17+(-2) = -17-2$

Ex: Add or Subtract the following:

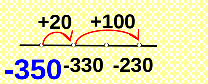
i) $-8+(3) = -5$ ii) $-9+(-2) = -9-2 = -11$

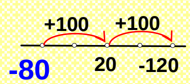




$iii) -350-(-120)$ $iv) -80-(-200)$

$= -350+120 = -230$ $= -80+200 = 120$





Factor: A number that divides evenly into another given number

Greatest Common Factor: (GCF)

The largest factor that is common to two or more numbers.

Keep dividing by a common factor and then multiply all the common factors.

Ex: Find the GCF of 48 and 72:

2 | 48,72 ie: Divide both numbers by 2

6 | 24,36 Divide by 6

2 | 4,6 Divide by 2

1 | 2,3 → LCD: $(2\times6\times2)$=24

Prime Number: A number that only has 2 factors, 1 and itself.

ie: 2,3,5,7,11,13,17,19,23,29…etc.

Mixed Fraction to Improper Fractions:

When changing a mixed fraction to an improper fraction, multiply denominator by the whole number and then add the numerator.

Note: the denominator does not change

ie: Convert from Mixed to Improper:

$4\frac{2}{3} = \frac{3}{3}+\frac{3}{3}+\frac{3}{3}+\frac{3}{3}+\frac{2}{3} = \frac{14}{3}$ $\quad (3\times4)+2 = 14$

$3\frac{7}{11} = \frac{11}{11}+\frac{11}{11}+\frac{11}{11}+\frac{7}{11} = \frac{40}{11}$ $\quad (11\times3)+7 = 40$

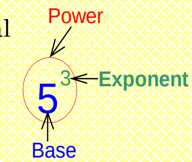
Ch 1 Number Connections:

1.1 Exponents & Powers:

Exponential Form (Power)	Factored Form	Standard Form
2^4	$2\times2\times2\times2$	16
$5^3\times5^2$	$(5\times5\times5)\times(5\times5)$	3125

The number in exponential form is called a power.

ie: 5 to the power of 3.



Ex: Simplify in Exponential form:

$i) 7^4\times7^2\div7^3 = \frac{(7\times7\times7\times7)\times(7\times7)}{(7\times7\times7)} = 7^3$

$ii) (5^2)^3 = (5^2)\times(5^2)\times(5^2) = 5^6$

1.2 Integral Exponents:

Standard Form		Exponential Forms	
Decimal	Fraction	Posit. Exp.	Neg. Exp.
10,000		10^4	
1,000		10^3	
100		10^2	
10		10^1	
1		10^0	
0.1	$\frac{1}{10}$	$\frac{1}{10^1}$	10^{-1}
0.01	$\frac{1}{100}$	$\frac{1}{10^2}$	10^{-2}
0.001	$\frac{1}{1,000}$	$\frac{1}{10^3}$	10^{-3}
0.0001	$\frac{1}{10,000}$	$\frac{1}{10^4}$	10^{-4}

1.4/1.5 Writing in Scientific Notation:

Large Numbers have a positive exponent.
Small Numbers have a negative exponent.

Ex: Write in Scientific Notation:

$i) 175000 = 1.75\times10^5$ $\quad ii) 0.000074 = 7.4\times10^{-5}$

Convert from Scientific to Standard Form

Steps:

Positive exponent → move decimal right

Negative exponent → move decimal left

The exponent shows many digits moved

Ex: Convert to Standard Form:

$i) 1.53\times10^5 = 153000$ $\quad ii) 2.73\times10^{-4} = 0.000273$

1.6 Rational Numbers

Rational Numbers: Numbers that can be written as a fraction. Includes all integers, fractions, mixed numbers, terminating & repeating decimals.

Ie: $100,\ \frac{3}{2},\ \frac{-5}{-6},\ 1.73,\ 1.\overline{211},\ \sqrt{9}$

1.11 Squares and Square Roots

$2\times2 = 4 \rightarrow \sqrt{4} = 2$

$10\times10 = 100 \rightarrow \sqrt{100} = 10$

$(-15)\times(-15) = 225 \rightarrow \sqrt{225} = 15$

Note: Square root of a number is positive

Ch 2: Operations with Fractions

Finding Lowest Common Multiple: LCM

Keep dividing by a common factor and then multiply all the common factors with the last pair of numbers:

Ex: Find the LCM of 48 and 72:

8 | 48,72 ie: Divide both numbers by 8

3 | 6,9 Divide by 3

1 | 2,3 No more common factors

LCM=$(8\times3\times2\times3)$=144

2.2/2.3 Adding & Subtracting Fractions

When adding or subtracting fractions, find the lowest common denominator(LCD). Only if denominators are the same, then you can add/subtract the top.

Ex: Simplify:

$\frac{3}{4}+\frac{2}{3}$ LCD: $\langle4,3\rangle = 12$ $\quad$ ii) $\frac{7}{8}-\frac{3}{6}$ LCD: $\langle8,6\rangle = 24$

$\frac{9}{12}+\frac{8}{12}$ Add only $\quad \frac{21}{24}-\frac{12}{24}$ Subtract only

$\frac{17}{12}$ the top $\quad \frac{9}{24}$ the top

2.5/2.6 Multiplying &Dividing Fractions

When multiplying fractions, simplify by cancelling out common factors in both the numerator and denominator.

Ex: Simplify by Multiplying:

$\frac{16}{21}\times\frac{14}{24}$ Common Factor: 7, 8 $\quad$ ii) $\frac{15}{36}\times\frac{27}{35}\times\frac{14}{12}$ Common Factor: 5, 9

$\frac{2}{3}\times\frac{2}{3}$ Multiply tops &bottom $\quad \frac{3}{4}\times\frac{3}{7}\times\frac{14}{12}$ Common Factor: 7, 3

$\frac{4}{9}$ $\quad \frac{3}{4}\times\frac{1}{1}\times\frac{2}{4}$

$\frac{3}{4}\times\frac{1}{1}\times\frac{1}{2} = \frac{3}{8}$

Note: When cancelling common factors, you can cancel up & down only, not sideways.

When dividing fractions, flip the second fraction (reciprocal) and then simplify by multiplying.

Ex: Simplify by Dividing:

$\frac{6}{14}\div\frac{4}{21}$ Flip second fraction $\quad$ ii) $\frac{12}{49}\div\frac{36}{28}\div\frac{44}{18}$ Flip fractions divided

$\frac{6}{14}\times\frac{21}{4}$ Simplify $\quad \frac{12}{49}\times\frac{28}{36}\times\frac{18}{44}$ Simplify

$\frac{3}{2}\times\frac{3}{2} = \frac{9}{4}$ $\quad \frac{3}{7}\times\frac{4}{9}\times\frac{9}{22}$

$\frac{3}{7}\times\frac{2}{1}\times\frac{1}{11} = \frac{6}{77}$

Order of Operations: BEDMAS

When simplifying expressions with more than one operation: $(\ ), \div, \times, +, -$

1st Simplify Brackets first

2nd Exponents

3rd: Multiply/Divide from left to right

4th Add/Subtract from left to right

Ex: Simplify:

$i)\ (3-5)^2 \times 3 \div 2$ — Brackets $(3-5)=-2$

$=(-2)^2 \times 3 \div 2$ — Exponents $(-2)^2 = 4$

$=4\times 3 \div 2$ — Multiply then Divide

$=12 \div 2 \quad =6$

$ii)\ \left(\frac{8}{3}\right)-\frac{2}{8}\times\frac{8}{3}+\frac{1}{2}$ — Multiply

$=\frac{8}{3}-\frac{2}{3}+\frac{1}{2}$ — Add/Subtract from left to right

$=\frac{6}{3}+\frac{1}{2}$ — Simplify: LCD

$=\frac{12}{6}+\frac{3}{6}=\frac{15}{6}=\frac{5}{2}$

$iii)\ \left(\frac{3}{2}+2\frac{5}{8}\right)\times 1\frac{13}{3}$ — Mixed fractions to improper

$=\left(\frac{3}{2}+\frac{21}{8}\right)\times\frac{16}{3}$ — Simplify Brackets

$=\left(\frac{12}{8}+\frac{21}{8}\right)\times\frac{16}{3}$ — Add fractions

$=\frac{39}{8}\times\frac{16}{3}=26$

2.7/2.8 Mult/Div. Rational Numbers

When **multiplying** rational numbers, convert them to fractions if possible. If not, then multiply by brute force or calculator.

$\frac{1}{2}=0.5$	$\frac{1}{5}=0.2$	$\frac{1}{8}=0.125$	$\frac{1}{9}=0.\overline{11}$
$\frac{1}{3}=0.\overline{3}$	$\frac{1}{6}=0.1\overline{6}$	$\frac{2}{8}=0.250$	$\frac{2}{9}=0.\overline{22}$
$\frac{1}{4}=0.25$	$\frac{1}{7}=0.\overline{142857}$	$\frac{3}{8}=0.375$	$\frac{3}{9}=0.\overline{33}$

Ex: Multiply:

i) 0.125×0.5	ii) 1.4×0.25	iii) 3.66×0.3
$=\frac{1}{8}\times\frac{1}{2}$	$=\frac{14}{10}\times\frac{1}{4}$	$=\frac{366}{100}\times\frac{1}{3}$
$=\frac{1}{16}$	$=\frac{3.5}{10}=0.35$	$=\frac{122}{100}=1.22$

When **dividing** rational numbers, multiply both numbers by 10, 100, or 1000 to eliminate the decimal places.

Ex: Divde

i) $0.3\div 0.15=\frac{0.3\times 100}{0.15\times 100}=\frac{30}{15}=2$

ii) $-.275\div 0.25=\frac{-0.275\times 1000}{0.25\times 1000}=\frac{-275}{250}=\frac{-11}{10}$

Applications of Fractions:

Ex : ⅓ of a class have black hair & ⅖ have blonde hair. If there are 30 students in the class, how many have neither black or blonde hair?

⅓ of $30=10$

⅖ of $30=12$ — 10+12 = 22 students

$30-22=8$ students have neither black or blonde hair.

Ex: John has \$500. He spent ⅕ on his car and ⅔ of what was left on rent. How much money is left?

⅕ *of* \$500 = \$100 (car) → \$400 left

⅔ *of* \$400 = \$266.66 (*rent*)

\$500 − 100 − 266.66 = \$133.33 left

Ch3: Ratio and Rate

3.2: Equivalent Ratios and Proportions

Ratios compare 2 or more numbers with the same unit. Reduce the ratio by dividing all numbers by the GCF. Ratios can also be written as a fraction.

ie: $3:4\rightarrow \frac{3}{4}$

Reducing a ratio does not change its value.

Ex: If there are 20 boys and 15 girls in a class, what is the ratio of boys to girls.

$20:15 \quad 20boys:15girls$

$4:3 \quad$ *Divide by common factor of* 5

Ex: There are 50 chocolate bars in a box. The ratio from O'Henry to Mars to Aero bars is 3:4:1. How many of each are there?

OHenry : Mars : Aero

$3x:4x:1x \quad$ "x" *is a scale factor*

$3(5):4(5):1(5) \quad 8x=50\rightarrow x=5$

15 : 20 : 5 → 15 *O'Henry*, 20 *Mars*, 5 *Aero*

3.4: Rate

Rates compare 2 numbers with different units.

Ex: Tom ate 30 burgers in 20minutes. At what rate can he eat burgers?

$Divide: \frac{30burgers}{20\min.}=1.5burgers/\min$

3.5: Unit Rates and Unit Prices

Unit rate: a rate where the 2nd term is 1

Unit price: the cost for 1 unit of an item. For unit prices, dollar value goes on top, and unit amount at the bottom.

Ex: 25 donuts at Tim Hortons cost \$5.00. What is the unit price for 1 donut?

$Unit\ Price=\frac{\$5.00}{24donuts}=\$0.21/donut$

Ex: Job A pays \$5000 in 10 days. Job B pays \$3000 in 6 days. Find unit rate for each job & compare which job pays better?

Find the unit rate of pay for each job

$JobA: \frac{\$5600}{10}=\$560/day$

$JobB: \frac{\$3200}{6}=\$533.33/day$

Job A pays more

Ex: Jake ran 75m in 11 seconds & Tom ran 200m in 28seconds. Find the unit rate for each person and compare who is faster.

$Jake: \frac{75m}{11s}=6.81m/s$

$Tom: \frac{200m}{28s}=7.14m/s$

Tom is faster.

3.6: Scale Drawings

A scale drawing is an exact representation of an actual object that is reduced or enlarged to fit into a drawing.

All scale drawings have a scale that shows how much an object is enlarged or reduced.

Drawing Ratio : Actual Object Ratio

ie: If scale is **1:5**, then actual object is 5 times **bigger** than drawing.

If scale is **5:1**, then actual object is 5 times **smaller** than drawing.

Ex: The drawing of a bug is 3cm long. The scale is 5:1. How long is the actual bug?

The bug is 5 times smaller than the drawing → $3cm\div 5=0.6cm$

The bug is 0.6cm or 6mm long.

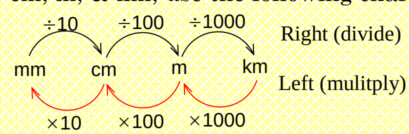
Ex: The drawing of a house is 11cm tall. The scale is 1:150. How tall is the house?

The house is 150 times bigger than the drawing. → $11cm\times 150=1650cm$

The house is 1650cm or 16.5m tall.

3.7: Maps & Scales

To convert units in the metric system: mm, cm, m, & km, use the following chart.



Ex: Convert 5000000mm to m.

To move from mm to m, you divide by 10 and then by 100. This is the same as dividing by 1000: ÷10 & ÷100 → ÷1000

$5000000mm\div 1000=5000m$

Ex: Simplify the scale: 1cm:500000km

1st convert 500000km to cm.

$500000\times 1000\times 100=50,000,000,000cm$

The ratio is then 1:50,000,000,000. Do not need units b/c both units are the same.

Ex: The scale of a map is 1:200,000. If a lake is 3cm long on the map, how big is the actual lake in km?

1st the lake is 200,000 times bigger

$3cm\times 200000=600,000cm$

2nd Convert 600,000cm to km.

$600,000\div 1000=600km$

Ch 4: Percents

A percent is a ratio comparing a number to 100. 45% is 45 out of 100

$60\%\rightarrow \frac{60}{100}=0.6$

$57\%\rightarrow \frac{57}{100}=0.57$

4.2/4.8: Finding Percent of a Number

When asked to find the "% **of** a given number", multiply the % by the number.

ie; 20% *of* $300=0.20\times 300=60$

Ex: 22.5% of 2700 students in Beaver High are from Asia. How many students are from Asia?

$0.225\times 2700=608students$

Ex:15% of a number is 57.Find the number.

Note: it's 15% "**of**" an unknown number "x"

$0.15(x)=57$ *divide both sides by* "x"

$x=57\div 0.15$

$x=380 \quad 15\%$ *of* 380 *is* 57

Ex: 20% of a number is 12. Find 5% of that number.

Note: it's 20% "**of**" an unknown number "x"

$0.20(x)=12 \quad 5\%$ *of* 60

$x=12\div 0.20 \quad =0.05\times 60$

$x=60 \quad =3$ (5% of the number is 3)

4.3: Estimating with a Percent

When estimating with percents, round the number to the nearest dollar or percent.

Ex: Find 33% of $895

$33\% \rightarrow 30\%$

$\$895 \rightarrow \$900$

$30\%\ of\ \$900 \rightarrow 0.3 \times \$900 = \$270$

Ex: Sara wants to give a 15% tip for a $85 dinner. How much tip should be given?

$10\%\ of\ \$85 \rightarrow 8.50$

$5\%\ of\ \$85 \rightarrow 4.25$

$total\ tip = 8.50 + 4.25 = 12.75$

4.4: Discount & Sale Price

Discount: A reduction in cost for an item

Ex: A $400 Mp3 is on sale at 35% off. What is the discount & sale price?

$Discount : 0.35 \times \$400 = \$140$

$SalePrice : \$400 - 140 = \$360.00$

4.5: PST & GST

PST: Provincial Sales Tax

GST: Goods & Services Tax

GST,PST,HST in Canadian Provinces 2007

	GST	PST	HST	Nun	6%	
Alb	6%			Ont	6%	8%
BC	6%	7%		PEI	6%	10%
Man	6%	7%		Queb	6%	7.5%
NB			14%	Sask.	6%	5%
NFL			14%	Y.T.	6%	
NS			14%	NWT	6%	

Ex: If PST & GST are both 7%, what is the total cost of $25 hat?

$PST : 0.07 \times \$25 = 1.75$

$GST : 0.07 \times \$25 = 1.75$

$TotalstCost : \$25 + 1.75 + 1.75 = \$28.50$

4.6: Commission

A wage that a salesperson would get based on a percentage of their sales. To find commission, multiply % with total sales.

Ex: John earns a 5% commission. How much will he earn if has $3000 in sales?

$Commission : 0.05 \times \$3000 = \$150$

Ex: Cindy earns $15/hr and a 3% on commission. How much does she earn if she worked 35hr & $20,000 in sales?

$Hourly : \$15/hr \times 35hr = \$525.^{00}$

$Commission : 0.03 \times \$20,000 = \$600.^{00}$

$Total : \$525 + \$600 = \$1125.^{00}$

4.10: Simple Interest

$\boxed{I = P \times r \times t}$ I : Interest Earned

P : Principal, $ in beginning

r : InterestRate : decimal form

T : Time, # of years – Divide by 12(months)

Divide by 52(weeks), Divide by 365(days)

Ex: Jerry deposited $3500 for 8months at 2.5% interest rate. How much interest will he earn?

$P = \$3500, r = 0.025, t = 8/12$

$I = (3500)(0.25)(8/12)$

$I = \$58.^{33}$

Ch5: Patterns & Relations:

5.1: Variables & Expressions:

Algebraic Expression: $3x - 8y + 7xy$

Terms: $3x, 8y, 7xy$

Variables: x, y : The value of a variable can change to whatever you assign them.

When evaluating, substitute the variable with the values they are given.

Ex: Evaluate, Given $x = 2, y = 1$

$i)\ 3x - 2(y+1)$ $\quad ii) - 4(3x + y)$

$= 3(2) - 2(1+1)$ $\quad = -4(3(2)+1)$

$= 6 - 4 = 2$ $\quad = -4(7) = -28$

5.2: Formulas

When finding formulas from a table of values, look for patterns.

Ex: Find a formula for each TOV.

i)

x	−1	3	6	9	12
y	9	5	2	−1	−4

Pattern: the sum of each pair adds to 8

Formula: $x + y = 8$

ii)

x	−1	3	6	9	12
y	4	8	11	14	17

Pattern: y is 5 more than x

Formula: $x + 5 = y$

Ex: The equation for the surface area of a cylinder is $S = 2(3.14)r^2 + 2(3.14)r \times h$

Find the area when $r = 4cm$ & $h = 6cm$.

1st plug in values for r & h

$S = 2(3.14)(4)^2 + 2(3.14)(4) \times (6)$

$S = 2(3.14)16 + 2(3.14)24$

$S = 100.48 + 150.72$

$S = 251.2cm^2$

5.3: Finding Ordered Pairs

With any function, every value for x will generate one value for y. Every pair of x & y can be mapped onto a grid as a point.

When finding ordered pairs, pick a few values for x and use the formula to find the values for y.

Ex: Find 5 ordered pairs from $y = 3x - 5$

$1^{st} : Let\ x = 0,1,2,3,4$

$2^{nd} : Solve\ for\ y$ Ordered Pairs:

$x = 0,\ y = 3(0) - 5 \rightarrow y = -5$ $\quad (0,-5)$

$x = 1,\ y = 3(1) - 5 \rightarrow y = -2$ $\quad (1,-2)$

$x = 2,\ y = 3(2) - 5 \rightarrow y = 1$ $\quad (2,1)$

$x = 3,\ y = 3(3) - 5 \rightarrow y = 4$ $\quad (3,4)$

$x = 4,\ y = 3(4) - 5 \rightarrow y = 7$ $\quad (4,7)$

Ex: Which of the following is not an ordered pair for: $2y + 3x = 8$

$(2,1),\ (1,2),\ (4,-3)$

$(2,1) : 2(1) + 3(2) = 8$

$(1,2) : 2(2) + 3(1) = 7 \leftarrow Not$ Ordered Pair

$(4,-3) : 2(-3) + 3(4) = 8$

5.4/5.5 Graphing Co-Ordinates (x, y)

Each coordinate is mapped onto a grid as a single point.

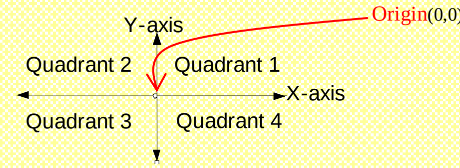
(x, y)

x-coordinate
Positive: right
Negative: left

y-coordinate
Positive: up
Negative: down

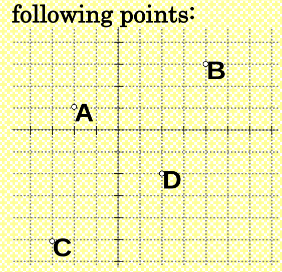
$(3,-5) \rightarrow 3\ right,\ 5down$

$(-4,8) \rightarrow 4\ left,\ 8\ up$



The origin is the center of the graph with coordinates of (0,0)

Ex: Indicate the co-ordinates for each of the following points:



$A(-2,1)$

$B(4,3)$

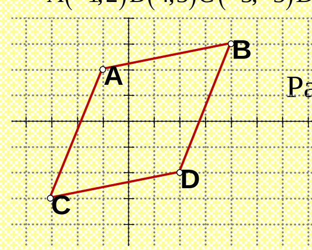
$C(-3,5)$

$D(-2,-2)$

Ex: Graph the following points, indicate what shape it is.

Graph each point and connect the dots

$A(-1,2)B(4,3)C(-3,-3)D(2,-2)$



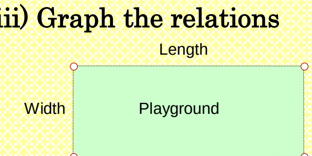
Parallelogram!

5.6 Graphing Relations:

When graphing a relation:

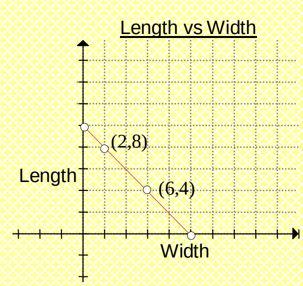
- Make a table of values,
- Plot each point on the grid,
- Make a title for the graph,
- Label both axis, and label a few points.

Ex: A school wants to build a rectangular fence of 20m around a playground. Write an algebraic expression for the perimeter
ii) Make a table of values &
iii) Graph the relations



$i)\ 2w + 2L = 20$ $\quad ii)$

x	1	2	4	5	6	8
y	9	8	6	5	4	2



Ch 6: Solving Equations:

6.1: Writing Equations

Terms:

Sum: Add — Product: Multiply

Difference: Subtract — Quotient: Divide

Ex: Write an equation that describes the sentence.

i) Eight less than a number is 12:

$$x-8=12$$

ii) Three more than double a number is 21

$$2x+3=21$$

iii) The sum of a number and six more than double a number is 50.

$$x+(6+2x)=50$$

6.2:/6.3 Solving Eq. by Add/Subtract

When solving for x, the goal is to isolate x.

Do the opposite of what x is doing. If x is adding a number, then subtract that number on both sides.

Ex: Solve for x:

i) $x+5=11$ — $x+5-5=11-5$ — $x=6$

ii) $x-7=11$ — $x-7+7=11+7+7$ — $x=18$

6.4/6.5: Solving Eq. by Mult/Div.

If x is multiplying a number, then divide that number on both sides. In contrast, if x is dividing a number, than multiply that number on both sides. Do the opposite.

Ex: Solve for x:

i) $3x=15$ — $\frac{3x}{3}=\frac{15}{3}$ — $x=5$

ii) $\frac{x}{4}=12$ — $4\left(\frac{x}{4}\right)=4(12)$ — $x=48$

When both sides have a denominator, multiply both sides with the LCD to cancel out the denominator.

Ex: Solve for "x"

i) $\frac{x}{4}=\frac{8}{3}$ LCD: 12 — $12\left(\frac{x}{4}\right)=12\left(\frac{8}{3}\right)$ — $3x=32$ — $x=\frac{32}{3}$

ii) $\frac{5}{x}=\frac{2}{3}$ LCD: $3x$ — $3x\left(\frac{5}{x}\right)=3x\left(\frac{2}{3}\right)$ — $15=2x$ — $\frac{15}{2}=x$

6.6 Liketerms:

Liketerms have the same variables with the same exponents.

ie: $3x, 11x, -170x$ are liketerms

$8x, 3x^2$ are not liketerms because the exponents of x are not the same.

Note: You could add or subtract terms ONLY if they are liketerms

Ex: Add or Subtract:

i) $3x+5x=16$ — $8x=16$ — $x=2$

ii) $6x+8x^2=14$ — $6x$ & $8x^2$ *not liketerms* — Can't add them

iii) $6x+5=8x$ Move liketerms to one side

$$6x+5-6x=8x-6x$$
$$5=2x$$
$$2.5=x$$

6.7: /Distributive Prop.

When a number is in front of a bracket, expand that number with every term inside the brackets.

$$3(5x+3)=15x+9$$

ie: $2x(4-3x)=8x-6x^2$

6.8/6.10:Solving Eq. with Several Steps

1st Use Distribute Property to simplify all brackets

2nd Move all liketerms to one side and combine liketerms

3rd Isolate "x"

Ex: Solve for x"

i) $9x+12=7x+6$ Move all liketerms to one side

$$9x-7x+12-12=7x-7x+6-12$$
$$9x-7x=6-12$$
$$2x=-6$$
$$x=-3$$

ii) $7=\frac{x}{3}+2x$ Multiply all terms by LCD: 3

$$3(7)=3\left(\frac{x}{3}\right)+3(2x)$$ Cancel out Denominators

$$21=x+6x$$
$$21=7x$$
$$3=x$$

iii) $3(2x-4)=9x+3$

$$6x-12=9x+3$$
$$6x-6x-12-3=9x-6x+3-3$$
$$-12-3=9x-6x$$
$$-15=-3x$$
$$5=x$$

Problem Solving:

Ex: Mark has 12 dollars more than Jack. The sum of all their money is 40, how much money does each person have?

Let Jack's money be x

Let Mark's money be $x+12$

Jack's money + Mark's money = 40

$$x+(x+12)=40$$
$$2x+12=40$$
$$2x=28$$
$$x=14 \rightarrow \textit{Jack has } \$14, \textit{Mark has } \$26$$

Ex: The sum of three consecutive integers is 72. Find the numbers:

Consecutive means that the numbers are in order. Ie: 1,2,3…33,34,35.

Let the numbers be: $x, x+1, x+2$

$$(x)+(x+1)+(x+2)=72$$
$$3x+3=72$$
$$3x=69$$
$$x=23 \rightarrow 23, 24, 25 \text{ are the numbers}$$

Author: D.G.W. Y.

Ch 7: 2 Dimensional Polygons

Polygon: A 2D shape with 3 or more sides

Triangle(3), quadrilateral(4), pentagon(5), hexagon(6), heptagon(7), octagon(8), nonagon(9), decagon(10), dodecagon(12)….

Perimeter: Distance around a polygon

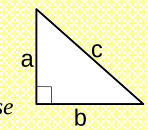
Area: Space inside a polygon

7.1/7.2: Pythagorean Theorem

a = height

b = base

c = hypotenuse



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

$a^2=c^2-b^2$ or

$b^2=c^2-a^2$

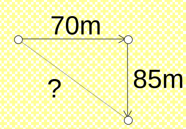
The Pythagorean Theorem can **only** be used with a Right Angle Triangle:

Hypotenuse MUST be the longest side. It is the opposite from the right angle

The Base and Height can be switched back and forth

Ex: Tom walks 70m East and 85m South. How far is Tom from where he started?

1st find a,b,c: $a=70, b=85, c=x$

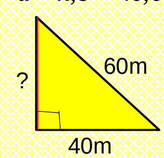


$$x^2=70^2+85^2$$
$$x^2=12125$$
$$x=\sqrt{12125}=110m$$

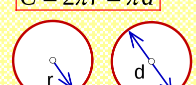
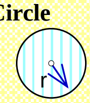
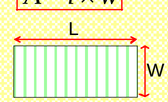
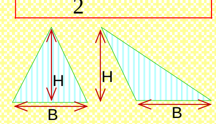
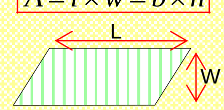
Tom is 110m from where he started.

Ex: Find the height of the triangle:

$a=x, b=40, c=60$

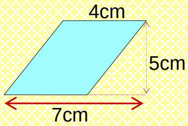


$$x^2+40^2=60^2$$
$$x^2+1600=3600$$
$$x^2=2000$$
$$x=\sqrt{2000}=44.7cm$$

Formula	NOTES
7.5 Circumference Circle ($\pi=3.14$) $C=2\pi r=\pi d$ 	Circumference is the distance around the circle. The formula depends on whether if you have the radius or the diameter. Diameter = radius x 2
7.9 Area - Circle $A=\pi r^2$ 	Area is the space inside circle. You must have the radius to use the formula. $(r=d\div 2)\&(r^2=r\times r)$
Area - Rectangle $A=l\times w$ 	Area of a Rectangle is just length times width. Note: For Squares, the length & width of a square are the same
Area -Triangle $A=\frac{b\times h}{2}=0.5\times b\times h$ 	The area of a Triangle is half of a rectangle. Therefore it is divided by 2. The base & height must be perpendicular.
Area Parallelogram $A=l\times w=b\times h$ 	Area of a Parallelogram is the same as a rectangle. The length is the base. The height is the width.

Ex: Find the AREA of each shape:

i) $Base = 4cm,\ Height = 5cm$

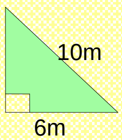


$A = B \times H$

$A = 4 \times 5$

$A = 20cm^2$

ii) $Base = 6m,\ Height = x??$



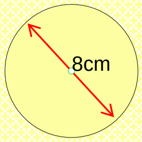
1^{st} : *Find height* 2^{nd} : *Find Area*

$10^2 = 6^2 + x^2$ $A = \frac{1}{2}(b \times h)$

$100 = 36 + x^2$ $A = \frac{1}{2}(8 \times 6)$

$\sqrt{64} = 8 = x$ $A = 24cm^2$

iii) $Diameter = 8cm$



1^{st} : *Find Radius* 2^{nd} : *Find Area*

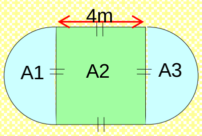
$R = D \div 2$ $A = \pi r^2 = (3.14)(4)^2$

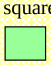
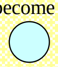
$R = 4cm$ $A = 50.3cm^2$

7.10: Composite Figures:

Composite Figure: A 2D shape made up of 2 or more polygons.

Ex: Find the Area of the shape



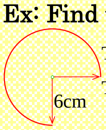
A_2 is a square  $A_1 + A_3$ add to become a circle 

$A_2 = L \times W$ $A_1 + A_3 = \pi(r)^2$ $Total = 16 + 12.6$

$A_2 = 4 \times 4$ $A_1 + A_3 = \pi(2)^2$ $= 28.6cm^2$

$A_2 = 16cm^2$ $A_1 + A_3 = 12.6cm^2$

Ex: Find the Perimeter



The circumference is $\frac{3}{4}$ of the circle.

The perimeter also includes the two radii's

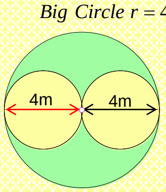
1^{st} : *Circum :* 2^{nd} : *Perimeter :*

$C = \frac{3}{4}(\pi)(6)^2$ $P = 84.8 + 6 + 6$

$C = 84.8cm$ $P = 96.8cm$

Ex: Find the area of the green part:

Big Circle r = 4cm, Small Circle r = 2cm



$Area = Big(Circle) - 2Sm(circle)$

$A = \pi(4) - 2(\pi)(2)^2$

$A = 50.3 - 25.1$

$A = 25.2cm^2$

Ch8: 3-Dimensional Solids

8.1: 3D Solids

Polyhedra: 3D solid where all sides are made of polygons

Prism: A solid where opposite sides are same & sides are rectangles

Pyramid: A solid with a base at the bottom & all sides are triangles that meet at the top.

Naming 3D Solids

Use the base to find the description & then write "prism" or "pyramid".

Examples of descriptions:

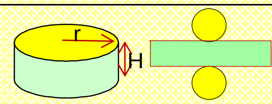
- Triangle → Triangular
- Rectangle → Rectangular
- Pentagon → Pentagonal
- Hexagon → Hexagonal

Ie: If the base is a triangle and it's a prism →Triangular Prism

8.2: Surface Areas:

The area of all the sides added together. Draw a "Net" to find the Surface Area (SA).

Cylinder

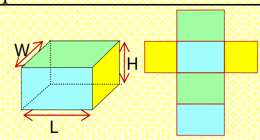


Top & bottom are circles. The rectangle has a length equal to the circumference.

$SA = 2(\pi r^2) + (2\pi r)H$

$SA = 2(Circles) + (Rectangle)$

Rectangular Prism



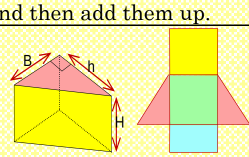
Get the area of all six sides and then add them up.

Top &Bottom : $2 \times (l \times w)$

Front &Back: $2 \times (l \times h)$

Left & Right: $2 \times (w \times h)$

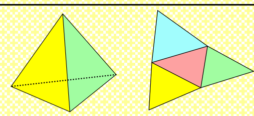
Triangular Prism



$SA = 2(Tri.) + 3(Rectangles)$

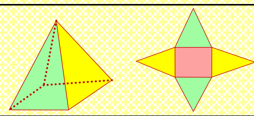
Note: $Triangle = \left(\frac{b \times h}{2}\right)$

Triangular Pyramid



$SA = Sum$ of 4 Triangles

Rectangular Pyramid



$SA = 1(Rectangle) + 4(Tri.)$

8.3: Volume:

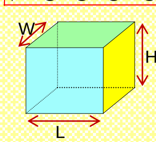
The space inside the 3D solid. For Prisms, the volume is always given by:

$Vol.\ of\ Prisms = (Area\ of\ Base) \times (Height\ of\ Prism)$

Cubes

$V = L \times W \times H$

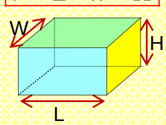
$V = S \times S \times S = S^3$



The base is $L \times W$, and the height is H. Therefore the volume is $L \times W \times H$. Since all the sides are same, it's also $S \times S \times S \rightarrow S^3$.
Units for volumes are always cubed ie: $mm^3, cm^3, m^3 \ldots$

Rectangular Prism

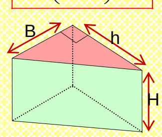
$V = L \times W \times H$



The base is $L \times W$, and the height is H. Therefore the volume is $L \times W \times H$.

Triangular Prism

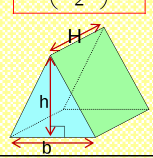
$V = \left(\frac{b \times h}{2}\right) \times H$



The base is a Triangle $\left(\frac{b \times h}{2}\right)$ and the height is H. Multiply the area of the triangle with the height.
Remember: **Base** and **Height** must be **perpendicular**

Triangular Prism(B)

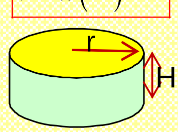
$V = \left(\frac{b \times h}{2}\right) \times H$



The base is also a triangle and the height is H. The prism can be rotated so it faces down. Therefore, the formula stays the same.

Cylinders:

$V = \pi(r^2) \times H$

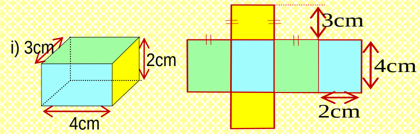


The base is a circle: $A = \pi r^2$, and the height is still H. Multiply the area of the circle by the "height" to get the volume.

When finding the Surface Area, draw a net for the solid. Find the area of each surface separately and add them.

Ex: Find the SA of each solid:

i)



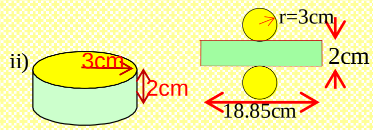
$S.\ Area = 2$ (A1) $+2$ (A2) $+2$ (A3)

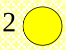
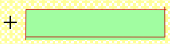
$S.\ Area = 2(3 \times 4) + 2(4 \times 2) + 2(2 \times 3)$

$S.\ Area = 2(12) + 2(8) + 2(6)$

$S.\ Area = 52cm^2$

ii)



$S.\ Area = 2$  $+$ 

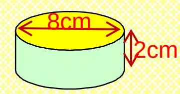
$S.\ Area = 2(\pi)(3)^2 + (18.85)(2)$

$S.\ Area = 94.2cm^2$

To find the Volume of a prism, first get the area of the base. Then multiply it with the height.

Ex: Find the Volume of each solid:

i) Diameter =8cm, Height =2cm



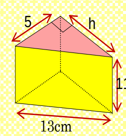
$r = 8 \div 2 = 4cm$

$V = \pi r^2 h$

$V = \pi(4)^2(2)$

$V = 100.5cm^3$

ii) Base=5cm, Hypotenuse =13cm, Height of Prism =11cm. Use pythagorus to find "h".



1^{st} *Find "h"* 2^{nd} *Volume*

$h^2 + 5^2 = 13^2$ $V = (Area\ base) \times (height)$

$h^2 = 169 - 25$ $V = (\frac{1}{2})(5)(12) \times (11)$

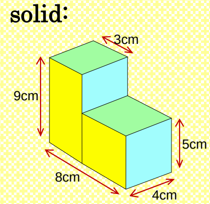
$h = \sqrt{144} = 12$ $V = 330cm^3$

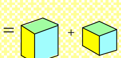
8.5: Composite Solids:

A 3D solid made up of 2 or more solids.

When finding volumes of composite solids: separate the shape into different prisms or pyramids. Find volume of each shape separately & add/subtract.

Ex: Find the volume of each composite solid:

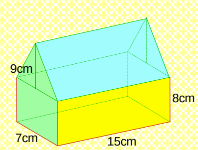


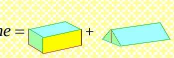
$Vol =$ 

$Vol = (l \times w \times h) + (L \times W \times H)$

$V = (3 \times 4 \times 9) + (5 \times 4 \times 5)$

$V = 208cm^3$

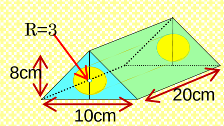


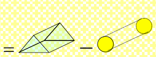
$Volume =$ 

$Volume = (l \times w \times h) + \left(\frac{b \times h}{2}\right) \times L$

$Volume = (15 \times 7 \times 8) + \left(\frac{7 \times 9}{2}\right) \times 15$

$Volume = 1312.5cm^3$



$Vol =$ 

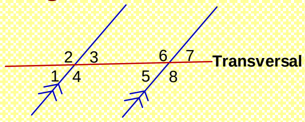
$Vol = \frac{1}{2}(b \times h) \times H - \pi r^2 H$

$V = \frac{1}{2}(10 \times 8) \times 20 - \pi(3)^2\ 20$

$V = 234.8cm^2$

CH 9 Geometry:

9.1/9.2: Angle & Lines



Transversal: Line crossing 2 parallel lines

Terms for Angles:

Complimentary: 2 $\angle$'s that add to 90°

Supplementary: 2 $\angle$'s that add to 180°

Acute: $\angle$'s less than 90°

Obtuse: $\angle$'s between 90° and 180°

Straight: $\angle$'s equal to 180°

Vertically Opposite: Equal $\angle$'s opposite to each other at an intersection
ie: $\angle 1 \& \angle 3, \angle 2 \& \angle 4, \angle 6 \& \angle 8, \angle 5 \& \angle 7$

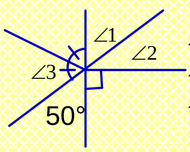
Corresponding Equal $\angle$'s that correspond at different intersections from two parallel lines
ie: $\angle 1 \& \angle 5, \angle 2 \& \angle 6, \angle 3 \& \angle 7, \angle 4 \& \angle 8$

Alternate Interior Equal $\angle$'s that form the "Z" with the parallel lines
ie: $\angle 4 \& \angle 6, \angle 3 \& \angle 5$

Co-Interior Supplementary $\angle$'s on the same side of a transversal between two parallel lines ie: $\angle 4 \& \angle 5, \angle 3 \& \angle 6$

Co-Exterior Supplementary $\angle$'s on the same side of a transversal on the outside of the two parallel lines. ie $\angle 2 \& \angle 7, \angle 1 \& \angle 8$

Ex: Find all missing angles:



$\angle 1 = 50^\circ$, *Vertically Opposite* $\angle$'s
$\angle 2 = 40^\circ$, Complimentary $\angle$'s
$\angle 3 = 65^\circ$, Supplementary $\angle$'s

9.4: Angles in Triangles

Note: The 3 Angles in a triangle add to 180°

Terms for Triangles

Equilateral: $\triangle$ with all 3 angles/sides equal
All 3 $\angle$'s are equal to 60°.

Isosceles: $\triangle$ with all 2 angles/sides equal

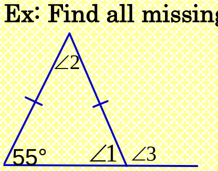
Scalene $\triangle$ with no equal angles/sides

Right Angle: $\triangle$ with 1 angle equal to 90°

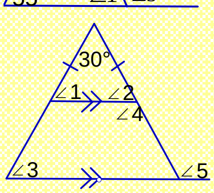
Obtuse: $\triangle$ with 1 angle greater than 90°

Acute: $\triangle$ with 3 angles less than 90°

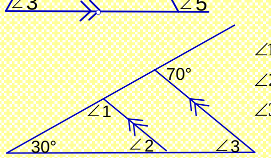
Ex: Find all missing angles:



$\angle 1 = 55^\circ$: *Isosceles* $\triangle$
$\angle 2 = 70^\circ$: $\angle$'s in $\triangle = 180^\circ$
$\angle 3 = 125^\circ$: *Suppl.* $\angle$'s



$\angle 1 = \angle 2 = 75^\circ$: *Isosceles* $\triangle$
$\angle 3 = 75^\circ$: *Corresponding* $\angle$'s
$\angle 4 = 105^\circ$:Supplimentary $\angle$'s
$\angle 5 = 105^\circ$:Alternate Interior $\angle$'s



$\angle 1 = 110^\circ$: *Co – Exterior* $\angle$'s
$\angle 2 = 40^\circ$: $\angle$'s in $\triangle$
$\angle 3 = 40^\circ$: *Corresponding* $\angle$'s

9.5: Angles in Polygons

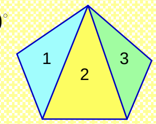
Formula: Sum of all angles in a polygon:

$S = (n-2)180^\circ$ $\quad n$: *number of sides*

Ex: Find the sum of all the angles in a pentagon.

1st: Pentagon has 5 sides → $n = 5$

$S = (5-2)180^\circ$
$S = (3)180^\circ$
$S = 540^\circ$

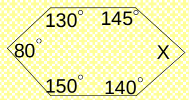


A pentagon can be turned into 3 triangles.
$3 \times 180^\circ = 540^\circ$

Ex: Find the sum of all the angles in a polygon with 120 sides.

$1^{st}: n = 120$ $\quad S = (120-2)180^\circ$
$S = 21240^\circ$

Ex: Find the value of the missing angle



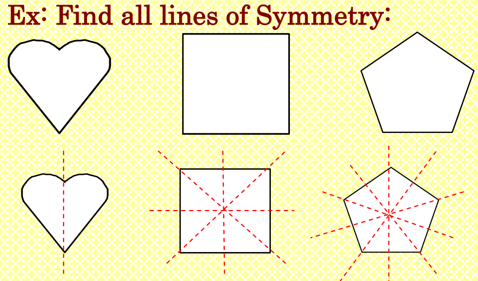
The solid is a hexagon, so The sum of all the interior angles is $S = 4 \times 180^\circ = 720^\circ$

$x + 145 + 130 + 80 + 150 + 140 = 720$
$x + 645 = 720$
$x = 75^\circ$

9.3 Line of Symmetry

A line that cuts a shape into two symmetrical halves.

Ex: Find all lines of Symmetry:



Ch 10: Statistics & Probability

10.1/10.2: Analyzing Data

Statistic: The science collecting, organizing and analyzing data

Survey: a process of collecting data from other people

Sample: a small group that is surveyed to represent a population

Population: The entire group is being studied.

A survey is to be unbiased, where everyone has an equal chance of being selected.

Frequency: the number of times something occurred.

To find the "Percent" divide the amount in each category by the total value.

Ex: A class of 50 students was surveyed on what their favourite color was. Use the chart to answer the following questions.

Colour	*Frequency*	*Percent*
Blue	15	$15/50 = 30\%$
Yellow	12	$12/50 = 24\%$
Red	8	$8/50 = 16\%$
Green	9	$9/50 = 18\%$
Orange	6	$6/50 = 12\%$
Total:	50	

i) Which color is the most popular? Blue

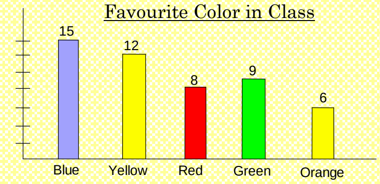
10.3/10.4/10.5: Bar/Line/Circle Graphs

Bar Graphs – Compares the amount of diiferent things

Line Graphs - Shows how something progresses over a period of time.

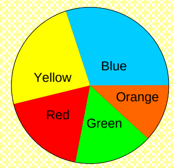
Circle Graphs: Shows how something is divided into smaller parts.

Ex: Draw a Bar Graph showing which color is the most popular:



Ex: Draw a Circle showing how the class was divided on their colors:

To Find the angle, multiply each percent by 360



Colour	*Percent*	*Degree*
Blue	30%	108
Yellow	24%	86
Red	18%	58
Green	16%	65
Orange	12%	43

10.7 Mean, Median, Mode, & Range

Mean: average of all the numbers. Add all the numbers then divide by how many there are.

Median: The middle number when all the terms are arranged from least to greatest. If two numbers are in the middle, then take the average of the two.

Mode: The number that appears the most.

Range: The difference between the biggest and the smallest value.

Ex: Given the set of numbers, find all the measures of central tendency.

3, 6, 11, 4, 5, 5, 8, 1, 5

$Mean = \frac{3+6+11+4+5+5+8+1+5}{9} = \frac{48}{9} = 5.\overline{33}$

$Median: 1,3,4,5,5,5,6,8,11 \rightarrow 5$

$Mode: 5$ $\quad Range: 11 - 1 = 10$

10.11/.12 Probability & Indep. Events

Probability: The likelihood of an event, ranging from 0 to 100%.

$$Probability = \frac{\#of\ Desired\ Outcomes}{Total\ \#of\ Outcomes}$$

Independent Events: Events that do not affect each other. If events are independent, multiply their outcomes.

Ex: Two dice are rolled. What is the probability of getting a sum greater than 9? Create a sum chart

	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

$\Pr(x > 9) = \frac{6}{36} = 16.7\%$

Ex: A coin & dice is rolled. What is the probability of getting a H & 3?

$\Pr = (head) \times (Dice: 3)$ independent events!

$\Pr = \frac{1}{2} \times \frac{1}{6} = \frac{1}{12}$