

Math 10 Foundations & Pre-calculus Final Review

WYNTKABATD

Chapter 1: Measurement

Unit conversions

- (1) imperial length conversions (ex. miles to yards)
- (2) SI length conversions (ex. Metres to kilometres)
- (3) imperial to SI (ex. feet to cm.)
- (4) SI to imperial (ex. metres to yards, feet and inches)

Chapter 2: Trigonometry

Know how to label sides as "opposite", "adjacent" and "hypotenuse" with respect to a particular angle.

Find a trig ratio from a diagram of a triangle with its side lengths labeled.

Use the calculator trig buttons to find trig ratios to four decimal places.

Use the calculator buttons (inverse trig buttons) to find the measure of an angle when given a decimal value or fraction for a trig ratio.

Find the measure of an angle when given the lengths of 2 sides in a diagram.

Find the length of a side when given one side and an acute angle.

Solve a triangle completely.

Interpret word problems to get an accurate diagram.

Solve situations involving 2 right triangles.

Chapter 3: Factors and Products

Write the prime factorization of a number - expanded and power forms.

Find the GCF of two or three numbers (list factors or use prime factorization technique).

Find the LCM of two or three numbers (list multiples or use prime factorization technique)

Use prime factorization to find the square root of a perfect square and the cube root of a perfect cube.

Find the GCF for the terms of a polynomial.

Factor a polynomial with a common factor.

Multiply polynomials and simplify.

Factor trinomials, including decomposition technique.

Factor differences of squares.

Chapter 4: Roots and Powers

Classify numbers as rational or irrational.

Simplify radicals (any root index).

Write a mixed radical as an entire radical (any root index).

Write a power with a rational number exponent as a radical.

Write a power with a negative exponent as a power with a positive exponent.

Apply exponent laws to simplify expressions.

Evaluate expressions involving numerical powers.

Chapter 5: Relations and Functions

Describe a relation in words.

Write a relation as a table, an arrow diagram, a set of ordered pairs, or as a graph.

Determine the domain and range of a relation from a table, an arrow diagram, a set of ordered pairs or a graph.

Identify the independent variable and dependent variable of a relation from a table, an arrow diagram, a set of ordered pairs, or a graph.

Determine if a function is linear.

Find the rate of change for a linear function.

Complete a table of values to graph any relation if given is equation.

Find the x and y intercepts of a linear function from its equation.

Graph a linear function using its x and y intercepts.

Chapter 6: Linear Functions

Find the slope of a linear function from its graph or from its equation.

Identify when lines are parallel, perpendicular or neither.

Write equations of lines in slope-intercept form, slope-point form, standard form and general form, given:

- a graph
- slope and the y-intercept
- slope and a general point
- 2 points

Convert equations from one form to another.

Find the x-intercept and y-intercept of a linear function using a general form or standard form equation.

Graph linear functions using techniques for slope-intercept form, slope-point form, standard form and general form.

Chapter 7: Systems of Linear Equations

Solve and verify a linear system using:

- the graphical technique
- the strategy of substitution
- the strategy of elimination

Model and real world situation using a linear system.

Solve word problems using a linear system.

Use slope and y-intercept information from the equations only to determine how many solutions a system has.

Math 10 F&P Formulas:

Relationship between Imperial Units	Imperial Units to SI Units	SI Units to Imperial Units
1 ft. = 12 in.	1 in. \doteq 2.5 cm	1 mm \doteq 0.04 in.
1 yd. = 3 ft. 1 yd. = 36 in.	1 ft. \doteq 30 cm 1 ft. \doteq 0.3 m	1 cm \doteq 0.4 in. 1 m \doteq 39 in. 1 m \doteq 3.25 ft.
1 mi. = 1760 yd. 1 mi. = 5280 ft.	1 yd. \doteq 90 cm 1 yd. \doteq 0.9 m 1 mi. \doteq 1.6 km	1 km \doteq 0.6 mi.

SOH CAH TOA

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

Two Point Slope formula

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Slope-intercept Form

$$y = mx + b$$

Slope-point Form

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

Standard Form

$$Ax + By = C$$

General Form

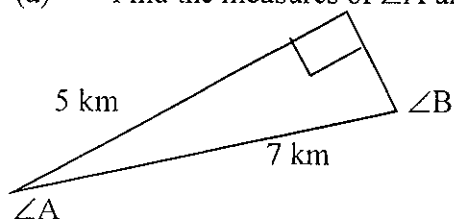
$$Ax + By + C = 0$$

A: Measurement

1. Convert each of the following
- (a) convert 1458 m to miles
- (b) convert 3 yd. 2 ft. to cm

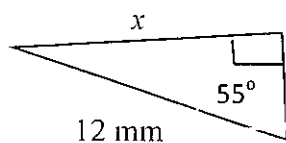
B: Trigonometry

1. Refer to the right triangle below.
- (a) Find the measures of $\angle A$ and $\angle B$ to the nearest degree.

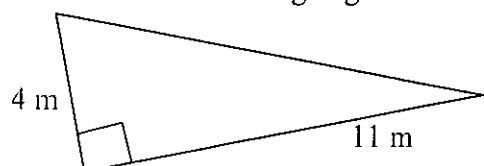


- (b) Now find the length of the missing side.

2. Determine the length of x :



3. Determine the missing angles:



4. Find the values of the following to 4 decimal places using your calculator:

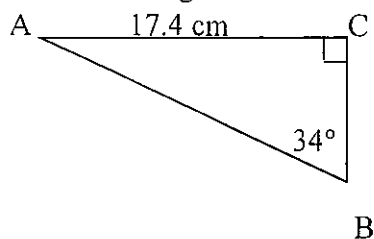
(a) $\sin 34^\circ =$ _____

(b) $\cos 58^\circ =$ _____

(c) $\tan 46^\circ =$ _____

5. If $\cos \theta = 0.5402$, find the measure of angle θ rounded to one decimal place.

6. Solve the triangle found below.



$m \angle A =$ _____

$m \angle C =$ _____

$\overline{AB} =$ _____

$\overline{BC} =$ _____

7. A flagpole casts a shadow that is 25 m long when the angle of between the sun's ray and the ground is 40 degrees. What is the height of the flagpole to the nearest meter?

8. An escalator is 14.5 m long. The escalator makes an angle of 27 degrees with the ground. What is the height of the escalator? Give your answer to the nearest tenth of a meter.

C: Factors and Products

1. Expand and simplify

(a) $(2x + 8)(3x - 2)$

(b) $5(x - 3)^2$

(c) $(4x + 3)^2$

2. Factor (*use prime factorization*)

(a) 324

(b) 120

3. Find the Greatest Common Factor

(a) 12 and 18

(b) 24 and 60

4. Find the Least Common Multiple

(a) 12 and 15

(b) 16 and 20

5. Perfect Squares and Cube Roots

(a) Using Prime Factorization find the square and cube root of 64

6. Factor polynomials using a greatest common factor (GCF)

(a) $6n^2 - 18n$

(b) $6x^3y^2 + 2xy^5$

7. Factor Trinomials

(a) $a^2 + 7a - 18$

(b) $x^2 - 8x + 7$

(c) $3v^2 - 8v + 4$

(d) $w^2 - 14w + 49$

8. Factor Difference of Squares

(a) $d^2 - 16$

(b) $4x^2 - 81$

9. Factor out a common factor then use difference of squares: $8x^2 - 72y^2$

D: Roots and Powers

1. Use prime factorization to simplify:

(a) $\sqrt{72}$

(b) $\sqrt[4]{256}$

(c) $\sqrt{147}$

2. Write as an Entire radical:

(a) $2\sqrt{7}$

(b) $5^3\sqrt{3}$

3. Estimate to 1 decimal place:

(a) $\sqrt{52}$

(b) $\sqrt[3]{30}$

4. Are the following Rational or Irrational Numbers?

(a) $\sqrt{\frac{4}{9}}$

(b) $\sqrt[2]{17}$

5. Evaluate:

(a) $36^{-\frac{1}{2}}$

(b) $27^{\frac{2}{3}}$

(c) $\left(\sqrt{\frac{4}{9}}\right)^{-3}$

6. Write the power as a radical: $15^{\frac{2}{3}}$ 7. Write the radical as a power with a fractional exponent: $\sqrt[3]{5^2}$

8. Multiply and Divide (do not leave negative exponents in your final answer)

(a) $(2^5)(2^3)$

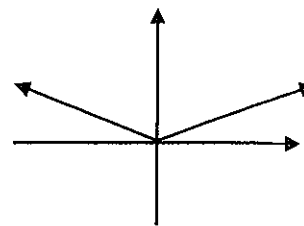
(b) $x^{\frac{1}{2}} \cdot x^{-2}$

(c) $\frac{(4xy)^2}{2y}$

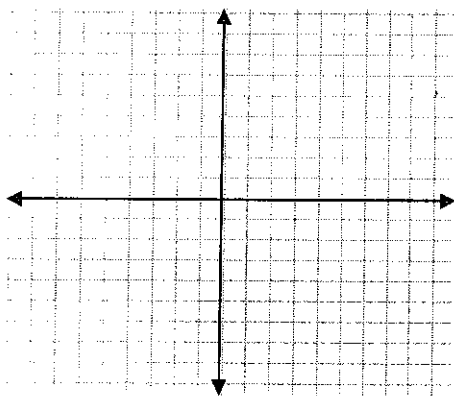
E: Functions and Relations

1. Refer to the graph to the right. Is this relation a function?

Why or why not?



2. Graph $6x + 2y = 12$ using x and y intercepts



x -int

y -int

3. Answer the questions about the relations in the following 2 tables:

Athlete	Sport
Crosby	Hockey
Jones	Curling
Ovechkin	Hockey
Wotherspoon	Speed skating

(a) Why is this relation a function?

(b) Represent this relation as an arrow diagram:

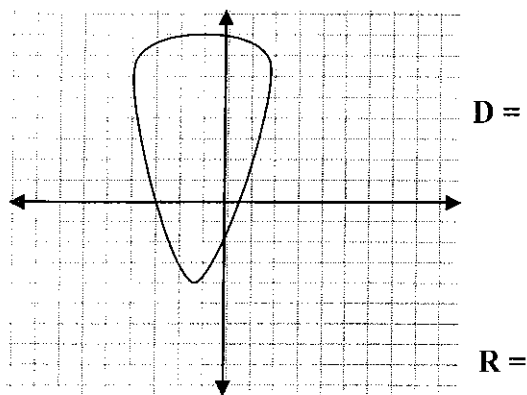
(c) Write the domain and range:

Number of Minutes n	Cost, C (\$)
10	2
20	4
30	6
40	8
50	10

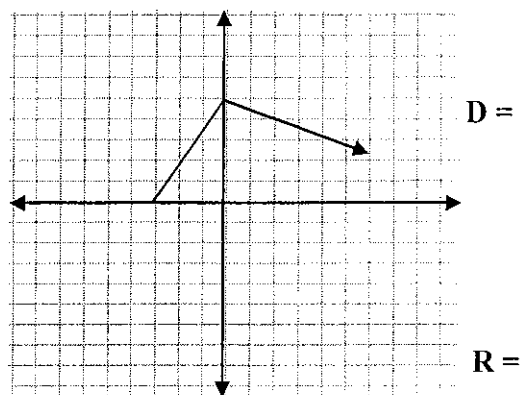
- (d) Why is this relation a function?
- (e) Write the domain and range.
- (f) Identify the dependent and independent variables.
- (g) Does this table represent a linear relation? How could you find out mathematically? How could you find out from a graph?

4. Find the domain and range for each graph. Are the following Functions?

(a)



(b)



5. Carmen works for a research company. The equation $P = 5n + 30$ represents her daily pay, P dollars, when she conducts n surveys.

(a) Write the equation using function notation.

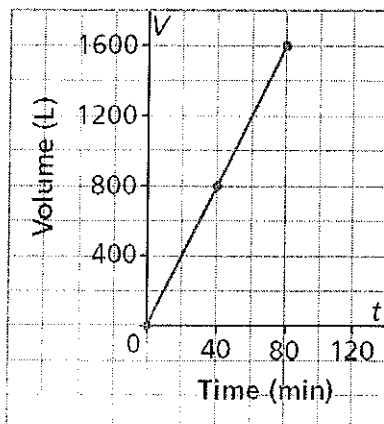
(b) Find the value of $P(8)$. Explain what this number represents.

(c) Find the value of n when $P(n) = 90$. Explain what this number represents.

6. Create a table of values for $y = x + 2$ choosing two negative x values, two positive values, and 0 for x . Does this table represent a linear relation?

7. Rate of Change

Filling a Hot Tub

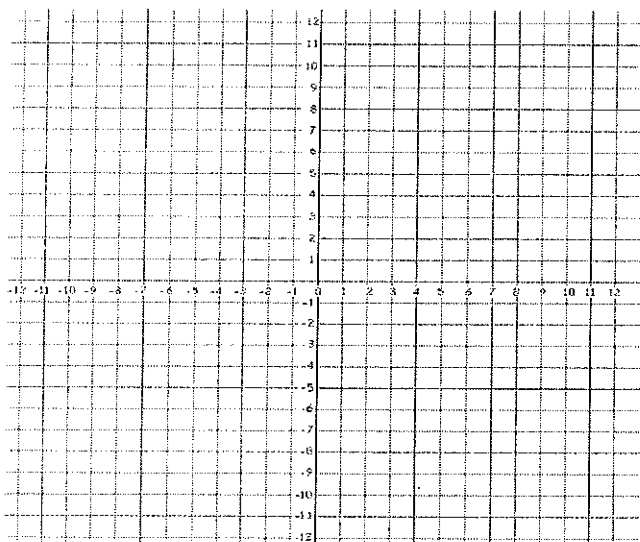


- a) Identify the dependent and independent variables.
- b) Determine the rate of change of this relation, then describe what it represents.

F: Linear Functions

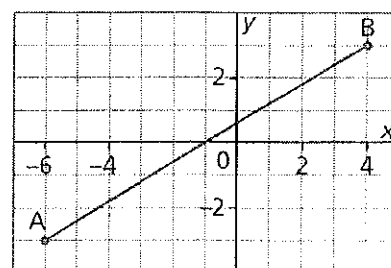
1. Graph the following linear function in the space provided using the slope and y -intercept method only. State the slope and y -intercept first.

$$y = \frac{3}{5}x - 4$$

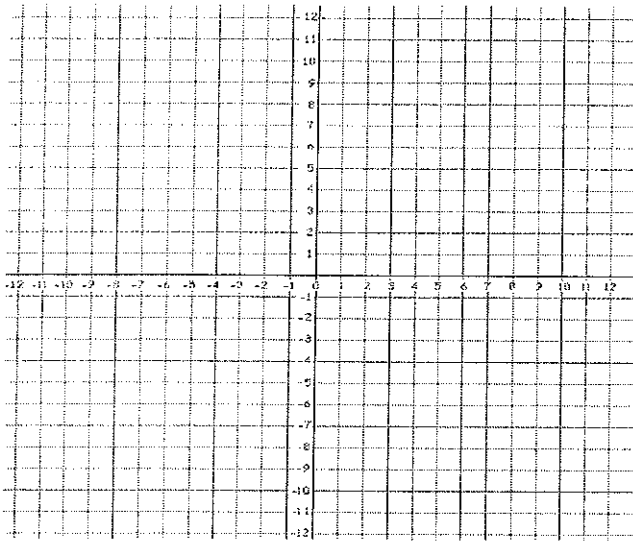


2. Find the slope:
- (a) of a line that passes through $(2, -3)$ and $(-4, 3)$

- (b) Find the slope from the graph to the right.

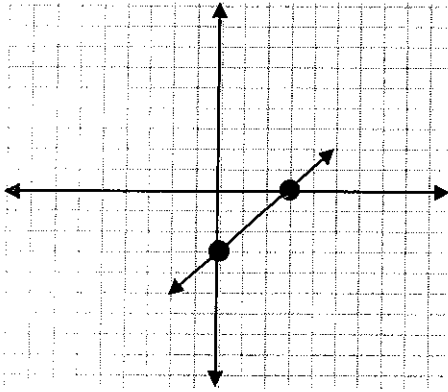


3. Graph a line whose slope is $\frac{-2}{3}$ and goes through $(3, 2)$, using the slope-point method.



4. Are $y = 2x - 3$ and $y = \frac{-1}{2}x - 4$ parallel, perpendicular or neither? Explain how you know.
5. Write the equation of the line in the specified form:
- (a) Write the equation of the line in slope-point form whose slope is 3 and passes through the point $(2, 5)$
- (b) Write the equation of the line in general form that passes through $(0, 3)$ and $(2, 3)$.

- (c) Write an equation in slope-intercept form for the line in the graph below:



- (d) Now write that same equations from questions (a), (b), and (c) in standard form and general form.

- (e) Write the equation of a line in slope-point form that has a slope of $\frac{-3}{4}$ and passes through $(2, -3)$.

- (f) Write the equation of a line in slope-point form that passes through $(-3, 5)$ and $(3, 1)$

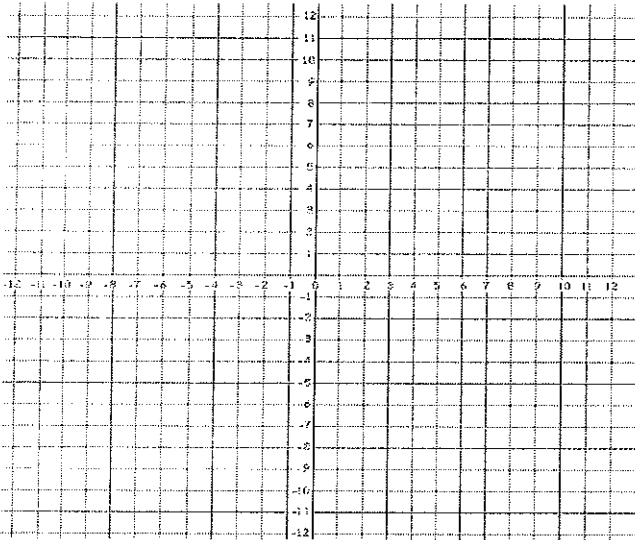
- (g) Write the equation $y = \frac{1}{2}x - 2$ in standard form and then into general form.

G: Linear Systems

1. Solve (and verify) this system graphically:

$$y = 3x - 7$$

$$x - y = 3$$



2. Solve (and verify) the system by substitution:

$$4x - 3y = 7$$

$$x + 2y = 10$$

3. Solve (and verify) the system by elimination:

$$5x + 2y = -5$$

$$3x + 4y = 11$$

4. Without finding the solution, how many solutions does this system have? Justify your answer.

$$y = -\frac{5}{2}x + 4$$

$$50x + 20y = 100$$

5. Model this situation with a system of linear equations. Solve your linear system to solve the problem.

“Jack and Jill fetched a total of 27 pails of water between the two of them. Jill fetched 5 less pails than Jack did. How many pails did each of them fetch?”

Math 10 F&P

Final Review Answer Key

A. Measurement

1. (a) 0.8748 mi. (b) 330 cm

B. Trigonometry

1. (a) $\angle A = 44.4^\circ, \angle B = 45.6^\circ$ (b) 4.9 km
 2. 9.8 mm 3. 20° and 70°
 4. (a) 0.5592 (b) 0.5299 (c) 1.0355
 5. $\angle \theta = 57.3^\circ$ 6. $\angle A = 56^\circ, \angle C = 90^\circ, \overline{AB} = 31.1 \text{ cm}, \overline{BC} = 25.8 \text{ cm}$
 7. 21 m 8. 6.6 m

C. Factors and Products

1. (a) $6x^2 + 20x - 16$ (b) $5x^2 - 30x + 45$ (c) $16x^2 + 24x + 9$
 2. (a) $2 \cdot 2 \cdot 3 \cdot 3 \cdot 3 \cdot 3 = 2^2 \cdot 3^4$ (b) $2 \cdot 2 \cdot 2 \cdot 3 \cdot 5 = 2^3 \cdot 3 \cdot 5$
 3. (a) 6 (b) 12
 4. (a) 60 (b) 80
 5. see teacher's copy
 6. (a) $6n(n - 3)$ (b) $2xy^2(3x^2 + y^3)$
 7. (a) $(a + 9)(a - 2)$ (b) $(x - 7)(x - 1)$
 (c) $(3v - 2)(v - 2)$ (d) $(w - 7)(w - 7)$
 8. (a) $(d + 4)(d - 4)$ (b) $(x + 9)(x - 9)$
 9. $8(x + 3y)(x - 3y)$

D. Roots and Powers

1. (a) $6\sqrt{2}$ (b) 4 (c) $7\sqrt{3}$
2. (a) $\sqrt{28}$ (b) $\sqrt[3]{375}$
3. (a) 7.2 (b) 3.1
4. (a) rational (b) irrational
5. (a) $\frac{1}{6}$ (b) 9 (c) $\frac{27}{8}$
6. $(\sqrt[3]{15})^2$ 7. $5^{\frac{2}{3}}$
8. (a) $2^8 = 256$ (b) $\frac{1}{x^2}$ (c) $8x^2y$

E. Relations and Functions

1. It is a function because the graph passes the vertical line test.
2. x-int = 2, y-int = 6 see teacher's copy for the graph
3. (a) It is a function because no athlete gets paired with more than one sport.
(b) see teacher's copy
(c) $D = \{ \text{Crosby, Jones, Ovechkin, Wotherspoon} \}$
 $R = \{ \text{curling, hockey, speed skating} \}$
(d) It is a function because none of the numbers in the first column are duplicated and paired with a different number in the second column.
(e) $D = \{ 10, 20, 30, 40, 50 \}$ $R = \{ 2, 4, 6, 8, 10 \}$
(f) independent variable = n, dependent variable = C
(g) The relation is linear. Mathematically, the values for n go up consistently and so do the numbers for C. The graph would pass the VLT and the points would lie on a straight line.
4. (a) Not a function (fails the VLT). $D = -4 \leq x \leq 1.8$, $R = -4 \leq y \leq 8$
(b) It is a function (passes the VLT). $D = x \geq -3$, $R = y \leq 5$
5. (a) $P(n) = 5n + 30$

- (b) $P(8) = 70$. This number represents the pay Carmen will receive for completing 8 surveys.
- (c) $n = 12$. This number represents the number of surveys Carmen needs to complete in order to be paid \$90.

6. This is a linear function.

x	y
-2	0
-1	1
0	2
1	3
2	4

7. (a) The independent variable is t , and the dependent variable is V
- (b) rate of change is 20 The tub fills at a rate of 20 litres per min.

F. Linear Functions

1. slope = $\frac{3}{5}$, y-intercept = -4 see teacher's copy for graph
2. (a) -1 (b) $\frac{3}{5}$ 3. see teacher's copy for graph
4. The lines are perpendicular because their slopes are negative reciprocals of each other.
5. (a) $y - 5 = 3(x - 2)$ (b) $y - 3 = 0$ (c) $y = x - 3$
- (d) Standard: $3x - y = 1$ $y = 3$ $x - y = 3$
- General: $3x - y - 1 = 0$ $y - 3 = 0$ $x - y - 3 = 0$
- (e) $y + 3 = -\frac{3}{4}(x - 2)$ (f) $y - 5 = -\frac{2}{3}(x + 3)$ or $y - 1 = -\frac{2}{3}(x - 3)$
- (g) standard: $x - 2y = 4$, general: $x - 2y - 4 = 0$

G. Linear Systems

1. $x = 2$, $y = -1$ see teacher's copy for graphs
2. $x = 4$, $y = 3$ 3. $x = -3$, $y = 5$
4. No solutions because the lines have the same slope, but different y-intercepts (parallel lines).
5. Jack fetched 16 pails and Jill fetched 11 pails.