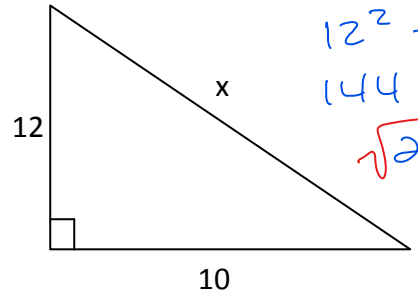
Key

Basic Skills to Review for Math 10 Foundations and Pre-Calculus Final Exam

<u>From Chapter 2</u>

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

1) Solve for x. (Pythagorean Theorem)

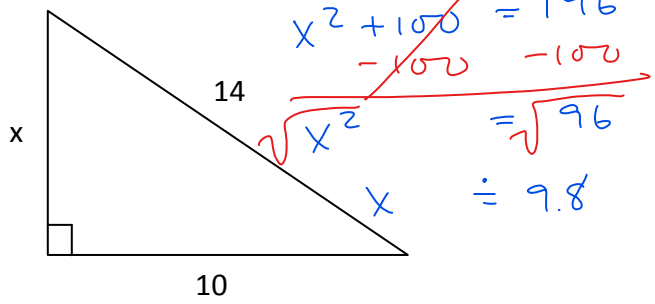


$12^2 + 10^2 = x^2$

$144 + 100 = x^2$

$\sqrt{244} = \sqrt{x^2}$

$15.6 \doteq x$



$x^2 + 10^2 = 14^2$

$x^2 + 100 = 196$

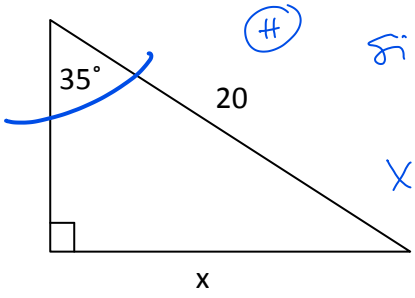
$-100 \quad -100$

$\sqrt{x^2} = \sqrt{96}$

$x \doteq 9.8$

SOH CAH TOA

2) Solve for x. (Using Sin, Cos, Tan Ratios)

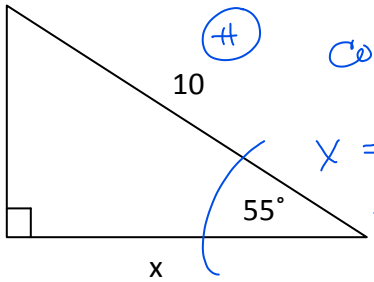


(H) $\sin 35 = \frac{x}{20}$

$x = 20 \cdot \sin 35$

$\doteq 11.5$

(O)



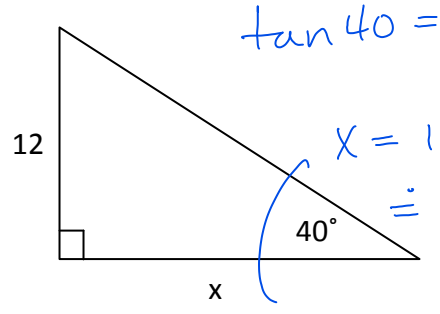
(H) $\cos 55 = \frac{x}{10}$

$x = 10 \cdot \cos 55$

$\doteq 5.7$

(A)

(O)



$\tan 40 = \frac{12}{x}$

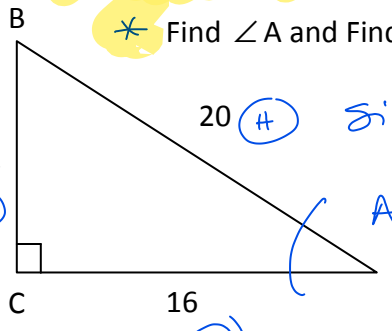
$x = 12 \div \tan 40$

$\doteq 14.3$

(A)

* MORE THAN ONE WAY TO SOLVE

* Find $\angle A$ and Find $\angle B$



(H) $\sin A = \frac{12}{20}$

(O)

$A = \sin^{-1}\left(\frac{12}{20}\right)$

$\doteq 37°$

(A)

$\angle B: \quad 180 - 90 - 37 = 53°$

From Chapter 3

1) Multiply.

a) $(x+4)(x+6)$ $= x^2 + 6x + 4x + 24 = x^2 + 10x + 24$

b) $(2x-3)(x+5)$ $= 2x^2 + 10x - 3x - 15 = 2x^2 + 7x - 15$

c) $(x+4)(x^2+2x-3)$ $= x^3 + 2x^2 - 3x$
$+4x^2 + 8x - 12$
$= x^3 + 6x^2 + 5x - 12$

2) Factor. * REMEMBER GCF 1ST (IF POSSIBLE)

a) $3x - 6$ $= \frac{3x}{3} - \frac{6}{3} = 3(x-2)$
GCF = 3

b) $-5x + 10$ $= \frac{-5x}{-5} + \frac{10}{-5} = -5(x-2)$
GCF = -5

c) $x^2 - 100$ $= (x+10)(x-10)$
DIFF. OF SQ.

d) $4x^2 - 49$ $= (2x+7)(2x-7)$
DIFF. OF SQ.

e) $x^2 + 8x + 12$ $= (x+6)(x+2)$

f) $y^2 - 3y - 18$ $= (x-6)(x+3)$

g) $6x^2 + 13x - 5$ DECOMPOSITION
$6 \cdot -5 = -30$; $15 \cdot -2$; $15 - 2 = 13$
$\Rightarrow (6x^2 - 2x + 15x - 5)$
$2x(3x-1) + 5(3x-1)$
$= (3x-1)(2x+5)$

h) $3x^2 - 27$
① GCF = 3 $= 3(x^2 - 9)$
② DIFF. OF SQ. $= 3(x+3)(x-3)$

From Chapter 4

1) Simplify the following radicals.

$\sqrt{50} = \sqrt{5 \cdot 5 \cdot 2} = 5\sqrt{2}$

$\sqrt{200} = \sqrt{2 \cdot 2 \cdot 2 \cdot 5 \cdot 5} = 2 \cdot 5 \cdot \sqrt{2} = 10\sqrt{2}$

$\sqrt{64} = 8$

$\sqrt[3]{80} = \sqrt[3]{2 \cdot 2 \cdot 2 \cdot 2 \cdot 5} = 2\sqrt[3]{10}$

$\sqrt[3]{128} = \sqrt[3]{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2} = 2 \cdot 2\sqrt[3]{2} = 4\sqrt[3]{2}$

$\sqrt[4]{80} = \sqrt[4]{2 \cdot 2 \cdot 2 \cdot 2 \cdot 5} = 2\sqrt[4]{5}$

2) Rewrite as an entire radical.

$2\sqrt{5} = \sqrt{5 \cdot 2 \cdot 2} = \sqrt{20}$

$4\sqrt[3]{3} = \sqrt[3]{3 \cdot 4 \cdot 4 \cdot 4} = \sqrt[3]{192}$

3) Evaluate (without using a calculator).

$4^{\frac{3}{2}} = \left(\sqrt{4}\right)^3 = 2^3 = 8$

$8^{\frac{4}{3}} = \left(\sqrt[3]{8}\right)^4 = 2^4 = 16$

$(-16)^{\frac{3}{2}} = \left(\sqrt{-16}\right)^3$ IMPOSSIBLE → CANNOT $\sqrt{}$ A NEGATIVE #

WRITE IN RECIPROCAL POSITION

$\left(\frac{1}{8}\right)^{\frac{1}{3}} = (8)^{\frac{1}{3}} = \sqrt[3]{8} = 2$

$4^{-\frac{3}{2}} = \left(\frac{1}{4}\right)^{\frac{3}{2}} = \left(\sqrt{\frac{1}{4}}\right)^3 = \left(\frac{1}{2}\right)^3 = \frac{1}{8}$

$16^{.75} = 16^{\frac{3}{4}} = \left(\sqrt[4]{16}\right)^3 = (2)^3 = 8$

4) Express each radical as a power.

$\left(\sqrt[3]{4}\right)^5$ top → $4^{\frac{5}{3}}$ ← bottom

$\sqrt{5.5} = (5.5)^{\frac{1}{2}}$

$= \sqrt[2]{5.5}$

5) Simplify the following. Write all powers with positive exponents.

$\frac{x^2 y^3}{x y^5}$ * KEEP BASE, SUBTRACT EXPONENTS

$= x^{2-1} y^{3-5}$

$= x^1 y^{-2} = \frac{x}{y^2}$

$(x^{-2} y^3)(x^4 y^{-1})$ * KEEP BASE, ADD EXPONENTS

$= x^{-2+4} y^{3+(-1)}$

$= x^2 y^2$

$\left(\frac{x^2}{x^4}\right)^{-3} = \left(x^{2-4}\right)^{-3}$

$= \left(x^{-2}\right)^{-3}$ MULT. EXPONENTS

$= x^6$

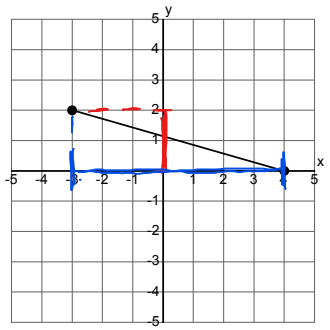
From Chapter 5

1) Write the Domain and Range for each of these relations.

a) {(0,3) (1,4) (2, 5)}

Domain: $\{0, 1, 2\}$ Range: $\{3, 4, 5\}$

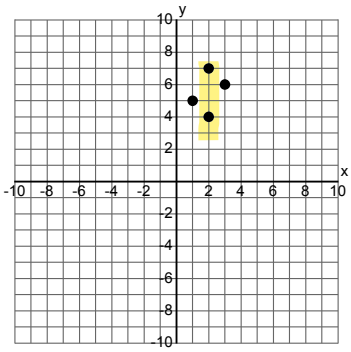
b)



Domain: $-3 \leq x \leq 4$

Range: $0 \leq y \leq 2$

2) Is the relation a function (yes or no)?



NO, DOES NOT PASS VERTICAL LINE TEST

** X-VALUE OF 2 IS USED MORE THAN ONCE, (2,4) & (2,7)

3) Is the function a linear relation (yes or no)?

a) {(0, 30) (1, 20) (2, 10) (3, 0)} YES, CONSTANT RATE OF CHANGE $\left(m = \frac{-10}{1}\right)$

-10 -10 -10

+1 +1 +1

b) {(1, 1) (2, 2) (3, 4) (4, 7) (5, 11)} NO, RATE OF CHANGE IS NOT CONSTANT

+1 +2 +3 +4

4) What is the rate of change for each linear relation below?

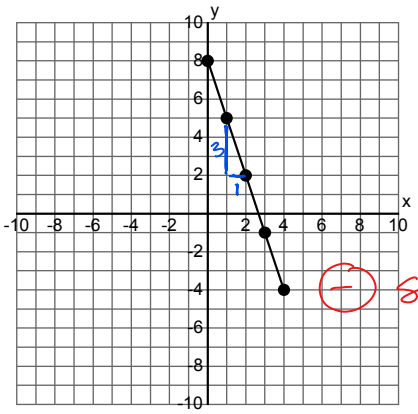
a) {(2, 10) (4, 20) (6, 30)}

+10 +10

+2 +2

RATE OF CHANGE (m) = $\frac{\text{RISE}}{\text{RUN}} = \frac{+10}{+2} = 5$

b)



(-) SLOPE

RATE OF CHANGE (m) = $\frac{-3}{+1} = -3$

down

right

5) If the function is f(x) = 2x + 4, find f(3).

$f(3) = 2(3) + 4$

$= 6 + 4$

$= 10$

WHEN $x = 3$

$f(x)$ or $y = 10$

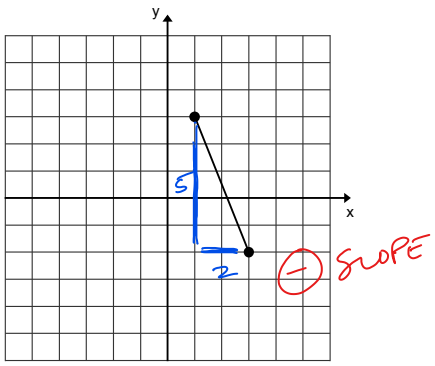
From Chapter 6

1) What is the slope of the line y = 2x + 3?

$y = mx + b$

SLOPE (m) = 2

2) What is the slope of the following graph?



$\text{SLOPE}(m) = \frac{\text{RISE}}{\text{RUN}} = \frac{-5}{+2}$ (down, right)

$-$ SLOPE

$x_1, y_1 \quad x_2, y_2$

3) What is the slope of the line that passes through the points (3, 6) and (-1, 4)?

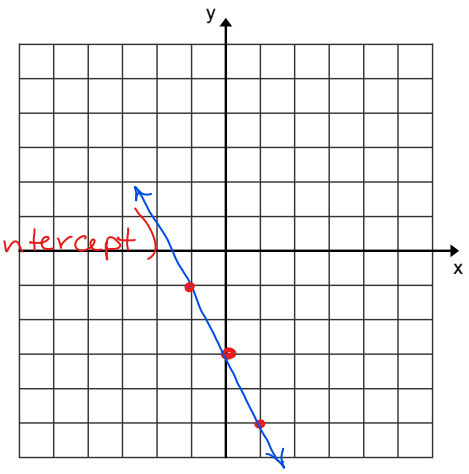
$m = \frac{y_2 - y_1}{x_2 - x_1} \text{ (RISE/RUN)} = \frac{4-6}{-1-3} = \frac{-2}{-4} = +\frac{1}{2}$

4) Graph the line 2x + y = -3.

$-2x \quad -2x$

$y = -2x - 3$

slope -2 (down 2, right 1); b (y-intercept)



5) Identify the slope and the coordinates of a point on the line of the equation y + 5 = -2(x – 4).

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

slope: $m = -2$

$y - (-5) = -2(x - 4)$

$P(4, -5)$

$(x_1, y_1) \Rightarrow$ POINT ON THE LINE

6) Write an equation in the form $y - y_1 = m(x - x_1)$ (slope/point form) for the graph of a linear function that passes through the points (1, 4) and (3, 7).

① $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{7-4}{3-1} = \frac{3}{2}$

② $y - y_1 = m(x - x_1)$ (x_1, y_1 and x_2, y_2)

$y - 4 = \frac{3}{2}(x - 1)$ OR $y - 7 = \frac{3}{2}(x - 3)$

7) Write the equation of the line in the form $y = mx + b$ (slope/intercept form) that has a y-intercept of 5 and is perpendicular to the line with an equation $y = 2x + 3$.

$b = 5$

$m = 2$

$m_{\perp} = -\frac{1}{2}$ (NEGATIVE RECIPROCAL)

$y = mx + b$

$y = -\frac{1}{2}x + 5$

8) Rewrite the equation $3x + 2y - 6 = 0$ into the form $y = mx + b$ (slope/intercept form).

*REARRANGE

$-3x \quad -3x$

$2y - 6 = -3x$

$+6 \quad +6$

$\frac{2y}{2} = \frac{-3x + 6}{2}$

$y = \frac{-3x}{2} + \frac{6}{2}$

$\boxed{y = -\frac{3}{2}x + 3}$

From Chapter 7

SUBSTITUTE & SOLVE FOR BOTH EQUATIONS

1) Is the point (2,3) a solution to the system below? (Why or why not?)

$3x - 2y = 0$
$x = y - 1$

$3(2) - 2(3) = 0$
$6 - 6 = 0$
$0 = 0$ ✓

$2 = 3 - 1$
$2 = 2$ ✓

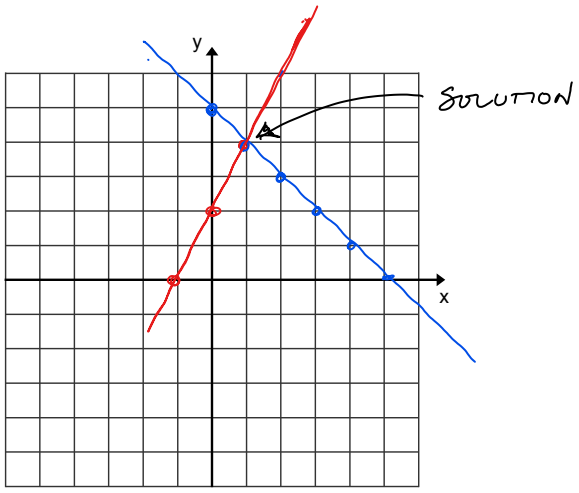
YES, P(2,3) WORKS FOR BOTH EQUATIONS

2) Solve the following system using the **Graphic Method**.

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

$m = \frac{2}{1}$ (2 up, 1 right) $b = 2$

x	y
0	5
1	4
2	3



Solution is (1, 4)

3) Solve the following system using the **Substitution Method**.

$2x + 3y = 11$
$y = 2x + 1$

① $2x + 3(2x + 1) = 11$
$2x + 6x + 3 = 11$
$8x + 3 = 11$
$-3 \quad -3$
$\frac{8x}{8} = \frac{8}{8}$
$x = 1$

② $y = 2x + 1$
$y = 2(1) + 1$
$y = 2 + 1$
$y = 3$

Solution is (1, 3)

4) Solve the following system using the **Elimination Method**.

$3x + 2y = 1$
$x - 3y = -7$ $\cdot -3$ → ①

① $x(-3) - 3y(-3) = -7(-3)$

② $-3x + 9y = 21$

$3x + 2y = 1$ (+)

$11y = 22$

$\frac{11y}{11} = \frac{22}{11}$

$y = 2$

$P(-1, 2)$

③ $x - 3y = -7$

$x - 3(2) = -7$

$x - 6 = -7$

$+6 \quad +6$

$x = -1$

5) How many solutions (none, infinite, one) does the system have?

a) $y = 2x + 3$
$y = 2x - 3$

m = SAME
b = DIFFERENT
} PARALLEL LINES
- WILL NEVER CROSS
- NO SOLUTION(S)

b) $-2x + y = 4$ → $-2x + y = 4$, $+2x \quad +2x$, $y = 2x + 4$
$4x - 2y = -8$ → $-4x \quad -4x$, $-2y = -4x - 8$, $\frac{-2y}{-2} = \frac{-4x}{-2} - \frac{8}{-2}$, $y = 2x + 4$

m = SAME
b = SAME
} SAME LINE
- INFINITE SOLUTIONS

6) Word Problem: Write the linear system that would help you solve the problem. (Be sure to identify your variables with LET statements.) You do not need to solve the problem.

$P = 2l + 2w$

a) The perimeter of a rectangle is 150 cm. If the length is twice the width, find the length and width of the rectangle.

LET w = WIDTH
l = LENGTH

$2w + 2l = 150$
$l = 2w$

b) The cost of 2 adult tickets and 3 child tickets is $35.00. The cost of 4 adult tickets and 1 child ticket is $45.00. What is the price for the adult and the child tickets?

LET A = COST OF ADULT TICKETS
C = COST OF CHILD TICKETS

$2A + 3C = 35$
$4A + 1C = 45$

Formulas for Math 10 Final Exam

Two Point Slope Formula: $m = \frac{y_1 - y_2}{x_1 - x_2}$

Slope-Intercept Formula: $y = mx + b$

Slope-Point Formula: $y - y_1 = m(x - x_1)$

General Form: $Ax + By + C = 0$

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

$$\text{SIN of an angle} = \frac{\text{side opposite the angle}}{\text{hypotenuse}}$$

$$\text{COS of an angle} = \frac{\text{side adjacent the angle}}{\text{hypotenuse}}$$

OR **SOHCAHTOA**

$$\text{TAN of an angle} = \frac{\text{side opposite the angle}}{\text{side adjacent the angle}}$$