NAME: - KEY -

LAMBRICK PARK SECONDARY SCHOOL

Foundations of Mathematics and Pre-Calculus 10

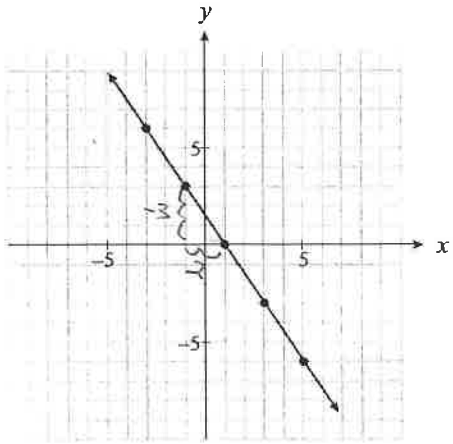
PRACTICE FINAL EXAM

2019

Instructions

1. When using your calculator (scientific or approved graphing calculator):
   - use the programmed value of π rather than the approximation of 3.14.
   - round only in the final step of the solution.
   - ensure that your calculator is set to DEGREE mode
2. Diagrams are not necessarily drawn to scale.

1. What is the **slope** of the following line?



Slope = $m = \frac{-3}{2}$

$y = mx + b$

2. What is the equation of the line passing through $(-1, 10)$ and $(2, -2)$ in **slope – intercept** form?

$x_1 \; y_1 \quad x_2 \; y_2$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-2 - 10}{2 - (-1)} = \frac{-12}{3} = -4$$

$$y - y_1 = m(x - x_1)$$
$$y - 10 = -4(x - (-1))$$
$$y - 10 = -4(x + 1)$$
$$y - 10 = -4x - 4$$
$$+10 \qquad +10$$
$$\boxed{y = -4x + 6}$$

3. If $f(x) = 5x + 6$, determine $f(-3)$.

$$f(-3) = 5(-3) + 6$$
$$= -15 + 6$$
$$\boxed{f(-3) = -9}$$

4. What is the Greatest Common Factor of 72, 56, and 40?

72 → 2, 36 → 2, 18 → 2, 9 → 3, 3

$= 2^3 3^2$

56 → 2, 28 → 2, 14 → 2, 7

$= 2^3 \cdot 7$

40 → 2, 20 → 2, 10 → 2, 5

$= 2^3 \cdot 5$

common primes in all lists

$GCF = 2^3 = \boxed{8}$

5. Which of the following numbers are **Irrational**? $-\sqrt{16}$, π, $\sqrt[3]{64}$, $\sqrt{28}$, $-3.3333\ldots$, $\sqrt[3]{4}$

$-\sqrt{16}$ $=-4$ Rational	π Irrational	$\sqrt[3]{64}$ $=4$ Rational	$\sqrt{28}$ Irrational	$-3.\overline{3}$ repeating decimal Rational	$\sqrt[3]{4}$ Irrational

6. Simplify: $3\sqrt{50}$

$= 3\sqrt{25\cdot 2}$ ← $\underline{\underline{25}}$ is biggest perfect $\underline{\text{square}}$ factor of 50!

$= 3\sqrt{25}\cdot\sqrt{2}$

$= 3\cdot 5\sqrt{2}$

$\boxed{= 15\sqrt{2}}$

7. Simplify: $(-27x)^{\frac{2}{3}}$

$= (-27)^{\frac{2}{3}}x^{\frac{2}{3}}$

$= \left(\sqrt[3]{-27}\right)^2 x^{\frac{2}{3}}$

$= (-3)^2 x^{\frac{2}{3}} = \boxed{9x^{\frac{2}{3}}}$

ex. $4^{\frac{3}{2}}$ ✿ - power, 𐀀 - root

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

8. Factor: $16p^2 - 81q^2$ ← difference of squares

$a^2 - b^2$

$= (a+b)(a-b)$

$\boxed{= (4p+9q)(4p-9q)}$

9. Determine the cube root, using the **grouping method**: $\sqrt[3]{91125}$
(2 marks)

$91125 = 3\cdot3\cdot3\cdot3\cdot3\cdot3\cdot5\cdot5\cdot5$

$91125 = (3\cdot3\cdot5)(3\cdot3\cdot5)(3\cdot3\cdot5)$

$91125 = (45)(45)(45)$

$\boxed{\therefore \sqrt[3]{91125} = 45}$

91125
5, 18225
5, 3645
5, 729
3, 243
3, 81
9, 9
3, 3, 3, 3

10. Write as a mixed radial in its simplest form: $\sqrt{192}$
(2 marks)

perfect square factors of 192

4, 16, 64

choose biggest one!

$= \sqrt{64\cdot 3}$

$= \sqrt{64}\cdot\sqrt{3}$

$\boxed{= 8\sqrt{3}}$

11. What is the slope and the y-intercept of the following? $3x - 4y + 4 = 0$

change to $y = mx + b$

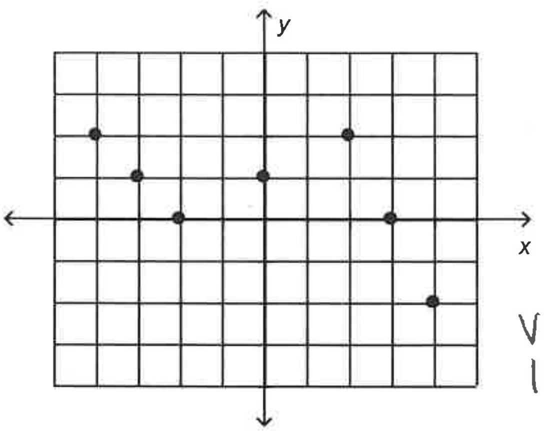
$$3x - 4y + 4 = 0$$
$$-3x \quad -4 \quad -3x - 4$$
$$\frac{-4y}{-4} = \frac{-3x}{-4} \frac{-4}{-4}$$
$$y = \frac{3}{4}x + 1$$

Slope: $\frac{3}{4}$

y-intercept 1

12. Are the following relations also **functions**?

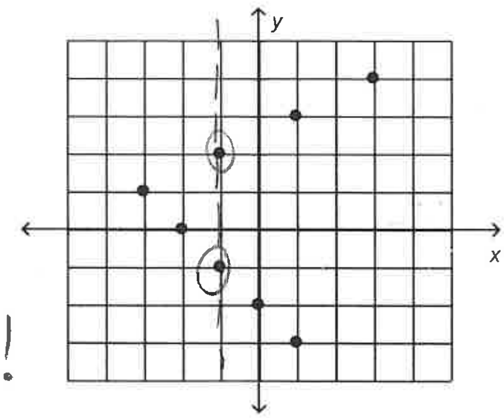
A)



Function Y / N

vertical line test!

B)



Function Y / N

13. A line segment has endpoints A(−7, 3) and B(8, −2). Determine the **slope** of AB.

$x_1 \; y_1 \qquad x_2 \; y_2$

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

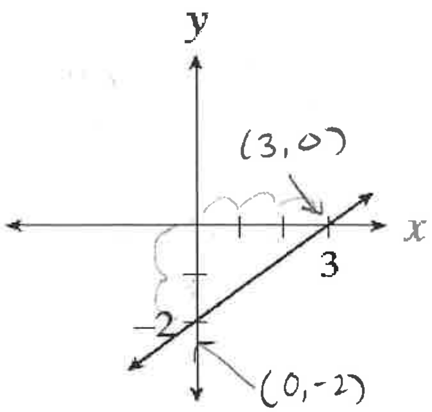
$$= \frac{-2 - 3}{8 - (-7)} = \frac{-5}{8 + 7} = \frac{-5}{15} = \frac{-1}{3}$$

SLOPE of AB: $m = \frac{-1}{3}$

positive → No fractions

$Ax + By = C$

14. What is the equation of the line below, in **STANDARD FORM**?



$m = \frac{2}{3}$

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

$y - 0 = \frac{2}{3}(x - 3)$

$(y = \frac{2}{3}x - 2) \times 3$

$3y = 2x - 6$

$+6 \quad -3y \qquad -3y + 6$

$6 = 2x - 3y \rightarrow \boxed{2x - 3y = 6}$

15. The slope of a line segment joining $M(-6, 3)$ and $N(4, k)$ is $\frac{3}{5}$. Determine the value of k.

$x_1 \; y_1 \qquad x_2 \; y_2$

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

$\rightarrow \frac{k - 3}{4 - (-6)} = \frac{3}{5}$

$\frac{k - 3}{4 + 6} = \frac{3}{5}$

$\frac{k - 3}{10} = \frac{3}{5}$

cross multiply

$\rightarrow 5(k - 3) = 3 \cdot 10$

$5k - 15 = 30$

$+15 \quad +15$

$\frac{5k}{5} = \frac{45}{5}$

$\boxed{k = 9}$

$k =$ 9

16. Determine an equation of the line passing through the point $(9, -3)$ and parallel to the line segment joining $A(4,7)$ *and* $B(1,5)$, in **slope – intercept** form.

x_1, y_1 (for $(9, -3)$)

$x_1, y_1 \qquad x_2 \; y_2$

$y = mx + b$

Use this point in the equation of a line.

parallel → same slope

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5 - 7}{1 - 4} = \frac{-2}{-3} = \frac{2}{3}$

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

$y - (-3) = \frac{2}{3}(x - 9)$

$y + 3 = \frac{2}{3}x - \frac{18}{3}$

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

$-3 \qquad\qquad -3$

$\rightarrow \boxed{y = \frac{2}{3}x - 9}$

17. Line AB passes through $\overset{x_1\ y_1}{(9,3)}$ *and* $\overset{x_2\ y_2}{(-4,7)}$. Line CD passes through $\overset{x_1\ y_1}{(4,-3)}$ *and* $\overset{x_2\ y_2}{(8,10)}$. Are these lines **parallel, perpendicular, or neither**?

same slope

negative reciprocal (flip and change the sign)

AB:

$$m = \frac{7-3}{-4-9} = \frac{4}{-13} = \frac{-4}{13}$$

flip and change sign $\rightarrow \frac{13}{4}$

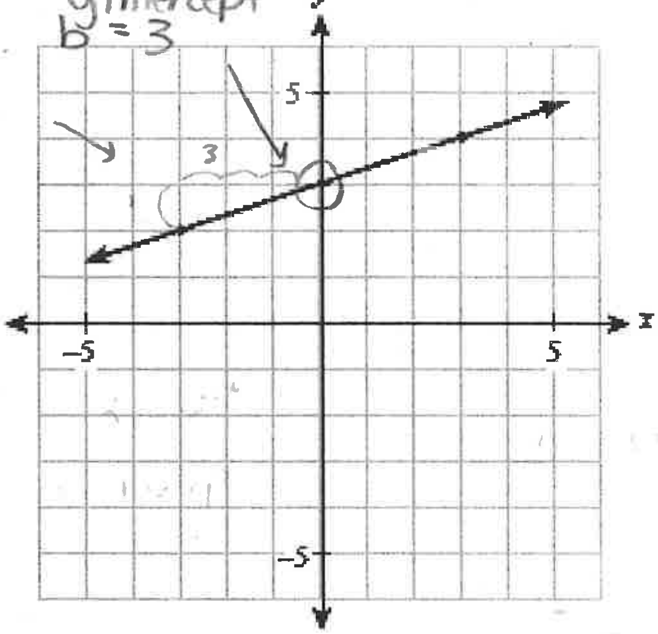
$$CD: m = \frac{10-(-3)}{8-4} = \frac{10+3}{4} = \frac{13}{4}$$

perpendicular

18. What is the equation of the line below, in **slope-intercept** form?

y intercept $b = 3$

Slope $m = \frac{1}{3}$

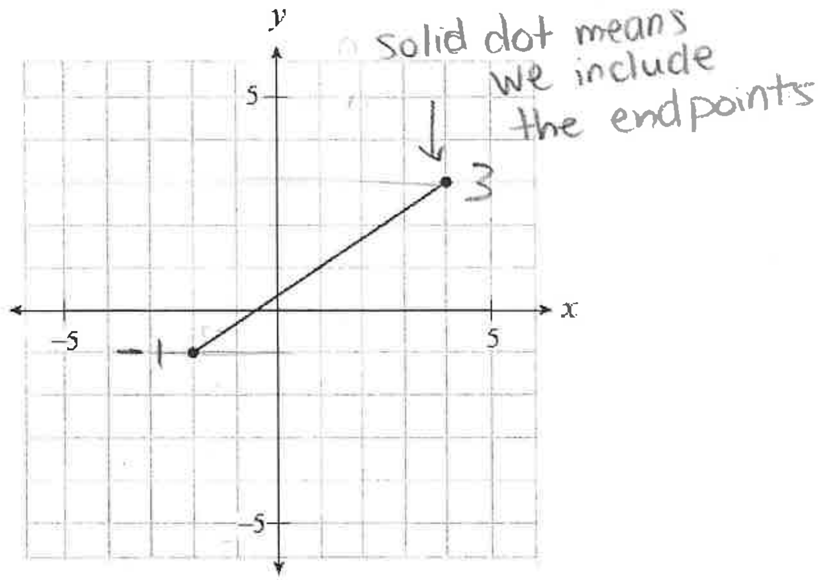


$y = mx + b$

$\boxed{y = \frac{1}{3}x + 3}$

19. Determine the **range** of the following graph.

all possible y-values



Range: $-1 \leq y \leq 3$

20. Determine the ***x*-intercept** and ***y*-intercept** of the graph of $9x + 6y = 72$

set $y=0$

$9x + 6(0) = 72$

$\frac{9x}{9} = \frac{72}{9}$

$x = 8$

$(8, 0)$

set $x=0$

$9(0) + 6y = 72$

$\frac{6y}{6} = \frac{72}{6}$

$y = 12$

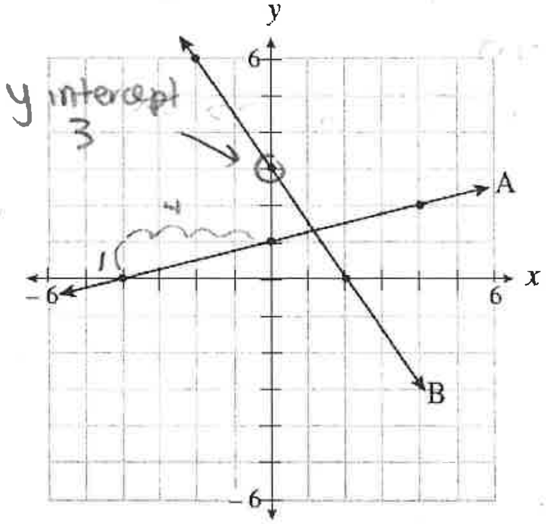
$(0, 12)$

x-intercept: $(8, 0)$

y-intercept: $(0, 12)$

$Ax + By = C$

21. Write an equation for a line, in **standard form**, with the same slope as line A and the same y-intercept as line B?



slope of A | y-intercept of B

$m = \frac{1}{4}$ | $b = 3$

$y = mx + b$

$(y = \frac{1}{4}x + 3) \times 4$ ← to get rid of fractions

$4y = x + 12$ ← put in the proper order

$-12 \quad -12$

$4y - 12 = x$

$-4y \quad -4y$

$-12 = x - 4y \rightarrow \boxed{x - 4y = -12}$

22. The graph of $y = 4x + k$ has an x-intercept of $(-20, 0)$. Determine the value of k.

x y

$y = 4x + k$

$(0) = 4(-20) + k$ ← plug in x and y

$0 = -80 + k$ ← Solve for k

$+80 \quad +80$

$k = 80$

k = 80

23. Use the substitution OR elimination method to find the solution to the following linear system:

$-6x + y = 21$ and $x + 9y = 24$

Substitution:

$-6x + y = 21$

$x + 9y = 24 \rightarrow x = -9y + 24$

$-9y \quad -9y$

put into 1st equation for x

$-6(-9y + 24) + y = 21$

$54y - 144 + y = 21$

$55y - 144 = 21$

$+144 \quad +144$

$\frac{55y}{55} = \frac{165}{55} \rightarrow \boxed{y = 3}$

$x = -9y + 24$

$x = -9(3) + 24$

$x = -27 + 24$

$\boxed{x = -3}$

$\boxed{(-3, 3)}$

Elimination:

$-6x + y = 21$

$(x + 9y = 24) \times 6$

$6x + 54y = 144$

$+(-6x + y = 21)$

$\frac{55y}{55} = \frac{165}{55}$

$\boxed{y = 3}$

$\boxed{(-3, 3)}$

$x + 9(3) = 24$

$x + 27 = 24$

$-27 \quad -27$

$\boxed{x = -3}$

$d \quad = \quad 3x \quad n$

24. There is a collection of nickels and dimes. The number of dimes is three times the number of nickels. The total value of the collection is \$35.00. How many of each coin are there. Solve using system of equations.

let n be number of nickels
let d be number of dimes

$$\begin{cases} d = 3n \\ 0.05n + 0.10d = 35.00 \end{cases}$$ Solve using substitution

how much a nickel is worth

how much a dime is worth

$0.05n + 0.10(3n) = 35.00$

$0.05n + 0.3n = 35.00$

$\frac{0.35n}{0.35} = \frac{35.00}{0.35} \rightarrow \boxed{n = 100}$

$d = 3n$

$d = 3(100)$

$\boxed{d = 300}$

There are 100 nickels and 300 dimes

25. Simplify: $\frac{(x^2)^3}{(x^2)(x^{-5})}$

$\frac{x^6}{x^{-3}} = x^{6-(-3)} = x^{6+3} = \boxed{x^9}$

exponent Rules

$(x^a)^b = x^{a \cdot b}$

$x^a \cdot x^b = x^{a+b}$

$\frac{x^a}{x^b} = x^{a-b}$

$\left(\frac{x}{y}\right)^{-a} = \left(\frac{y}{x}\right)^a$

$(xy)^a = x^a y^a$

$x^{-n} = \frac{1}{x^n}$

26. Simplify: $\left(\frac{3x^4y}{5y^{-1}}\right)^{-2} = \left(\frac{5y^{-1}}{3x^4y}\right)^2$

$= \frac{5^2y^{-2}}{3^2x^8y^2} = \frac{25y^{-2-2}}{9x^8} = \frac{25y^{-4}}{9x^8} = \boxed{\frac{25}{9x^8y^4}}$

OR

$\left(\frac{3x^4y}{5y^{-1}}\right)^{-2}$

$= \left(\frac{3x^4y^1y^1}{5}\right)^{-2}$

$= \left(\frac{3x^4y^2}{5}\right)^{-2}$

$= \left(\frac{5}{3x^4y^2}\right)^2$

$\frac{5^2}{3^2(x^4)^2(y^2)^2}$

$\boxed{= \frac{25}{9x^8y^4}}$

27. Write as an **entire radical**: $5\sqrt[3]{16}$

$5 = \sqrt[3]{125}$

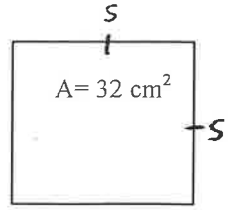
so $\quad 5\sqrt[3]{16}$

$= \sqrt[3]{125} \cdot \sqrt[3]{16}$

$= \sqrt[3]{125 \cdot 16} = \boxed{\sqrt[3]{2000}}$

28. A square has an area of 32 cm^2. What is the **side length** of the square as a **radical in simplest form**?

s = side length



$A = s^2$

$32 = s^2$

$\sqrt{s^2} = \sqrt{32}$

$s = \sqrt{32}$

$s = \sqrt{16} \cdot \sqrt{2}$

$s = 4\sqrt{2}$

biggest perfect square factor of 32 is 16!

side length is $4\sqrt{2}$ cm

29. What is the **greatest common factor** of $18x^2y^3$, $30x^3y$, and $8y^4$?

Biggest number and variable(s) that divide into each term... $= \boxed{2y}$

30. Find the **Least Common Multiple** of 54 and 180

$54 = 2 \cdot 3^3$

$180 = 2^2 \cdot 3^2 \cdot 5$

$54 = 2^1 \cdot 3^3$
$180 = 2^2 \cdot 3^2 \cdot 5^1$

now, take the highest power of each unique prime...

$LCM = 2^2 \cdot 3^3 \cdot 5^1$

$LCM = 4 \cdot 9 \cdot 5$

$* \boxed{LCM = 540}$

31. Expand and simplify: $(x + 5)(x - 4)(2x + 9)$

$= (x+5)(2x^2+9x-8x-36)$

$= (x+5)(2x^2+x-36)$

$= 2x^3 + x^2 - 36x + 10x^2 + 5x - 180$ * combine like terms

$\boxed{= 2x^3 + 11x^2 - 31x - 180}$

32. Factor the following: $6x^2 - 19x - 7$.

no GCF, a = 6, decomp!

$-21 \times 2 = -42$ (6x-7)
$-21 + 2 = -19$

$= 6x^2 + 2x - 21x - 7$

$= 2x(3x+1) - 7(3x+1)$

$\boxed{= (3x+1)(2x-7)}$

33. FULLY FACTOR the following: $16x^4 - 1$

perfect square, perfect square ← difference of squares!

$$=(4x^2+1)(4x^2-1)$$

another difference of squares!

$$\boxed{=(4x^2+1)(2x+1)(2x-1)}$$

34. FULLY FACTOR the following:

GCF of 2!

$$2x^4 - 2x^2 - 24$$

$$=2(x^4-x^2-12)$$ ← now, a = 1 !

$\underline{-4} \times \underline{3} = -12$

$\underline{-4} + \underline{3} = -1$

diff. of squares!

$$=2(x^2-4)(x^2+3)$$

$$\boxed{=2(x+2)(x-2)(x^2+3)}$$

35. Simplify: $(-125z^6)^{\frac{2}{3}}$

Flower power! → $= (-125)^{\frac{2}{3}}\left(z^{\frac{6}{1}}\right)^{\frac{2}{3}}$

$$=\left(\sqrt[3]{-125}\right)^2 z^{\frac{12}{3}}$$

$$=(-5)^2 z^4$$

$$\boxed{=25z^4}$$

36. Expand and simplify: $(x+2)(x^2-3x+8)$

$$=x^3-3x^2+8x+2x^2-6x+16$$

$$\boxed{=x^3-x^2+2x+16}$$

$a=1$, simple way!

37. Factor the following: $x^2 + 3x - 40$

(2 marks)

$\underline{8} \times \underline{-5} = -40$

$\underline{8} + \underline{-5} = 3$

$$\boxed{=(x+8)(x-5)}$$

no GCF, $a=6$, decomp!

38. Factor the following: $6x^2 + 19x + 10$

$\underline{15} \times \underline{4} = 60 \ (6 \times 10)$

$\underline{15} + \underline{4} = 19$

$$=\underbrace{6x^2+15x}+\underbrace{4x+10}$$

$$=3x(2x+5)+2(2x+5)$$

$$\boxed{=(2x+5)(3x+2)}$$

39. FULLY FACTOR the following: $98x^2 - 18$

GCF is 2!

$$=2(49x^2-9)$$

now, diff. of squares!

$$\boxed{=2(7x+3)(7x-3)}$$

40. State whether the following are relations, functions or one-to-one functions

a. (4, 2) , (3, 0) , (7, 1), (1, 0)   relation Y/N, function Y/N, 1-to-1 function Y/N

no repeats in domain — repeated 0's in range

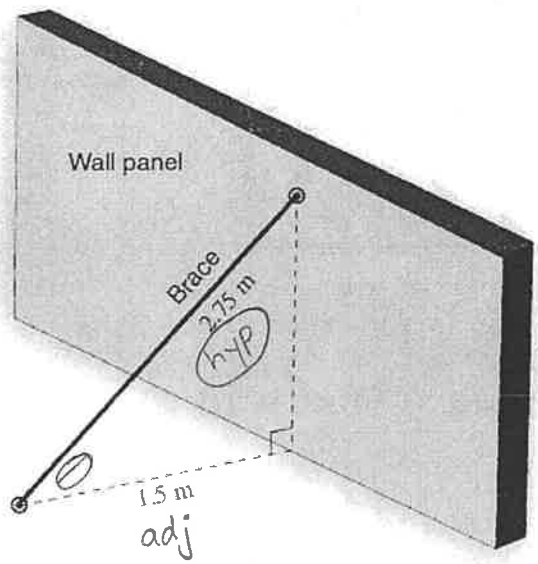
b. (1, 5) , (2, 9) , (4, 17) , (5, 21)   relation Y/N, function Y/N, 1-to-1 function Y/N

no repeats in domain — no repeats in domain OR range!

c. (5, -2) , (1, 1) , (5, 2) , (1, -1) relation Y/N, function Y/N, 1-to-1 function Y/N

↳ repeats in domain — ↳ can't be if not a function

41. This brace is 2.75 m long and must be anchored 1.5m from the base of the wall. **What angle does the brace make with the ground?** *Nearest tenth*



C A/H , use cos!

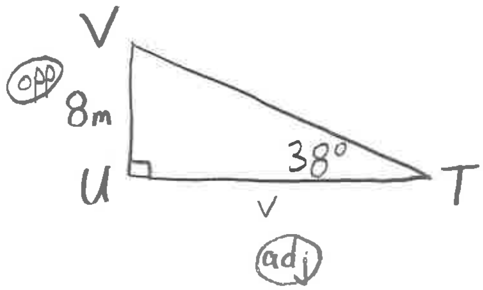
$\cos^{-1}\cos\theta = \cos^{-1}\frac{1.5}{2.75}$

$\angle\theta = \cos^{-1}\left(\frac{1.5}{2.75}\right)$

$\angle\theta = 56.9°$

$\boxed{\text{The angle the brace makes with the ground is } 56.9°}$

42. In $\triangle TUV$, UV = 8 m, $\angle U = 90°$, and $\angle T = 38°$. Determine the length of UT, to the nearest metre.



find UT... side v !

TOA, use tan!

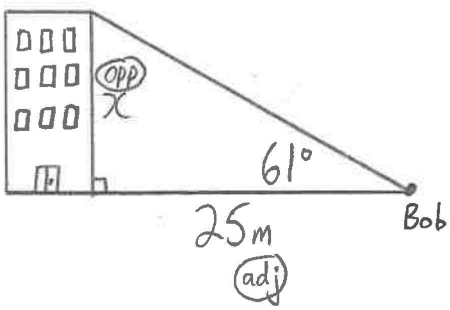
$\tan 38° = \frac{8}{v}$

$v = \frac{8}{\tan 38°}$

$v = 10.239...$

$\boxed{\text{side UT (v) has a length of 10m}}$

43. Bob is standing on a surveyors mark 25 m from the base of a building. He measures a 61° angle of elevation to the top of the building. How tall is the building to the nearest metre?



TOA, use tan!

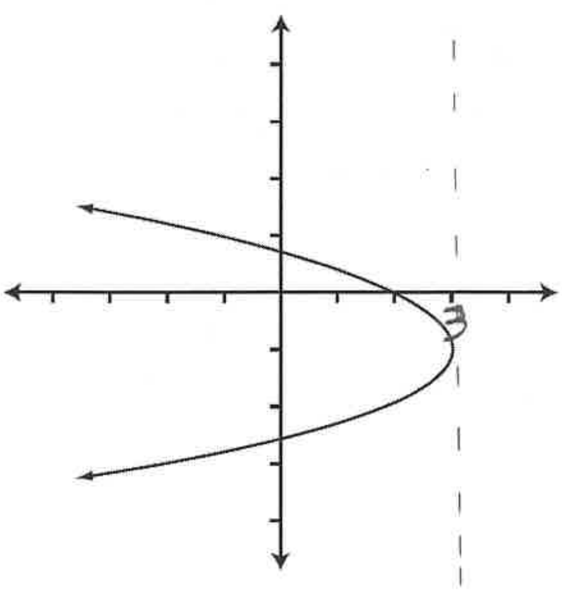
$(\tan 61°)^{\times 25} = \left(\frac{x}{25}\right)^{\times 25}$

$x = (\tan 61°) \times 25$

$x = 45.101$

$\boxed{\text{The building is 45m tall}}$

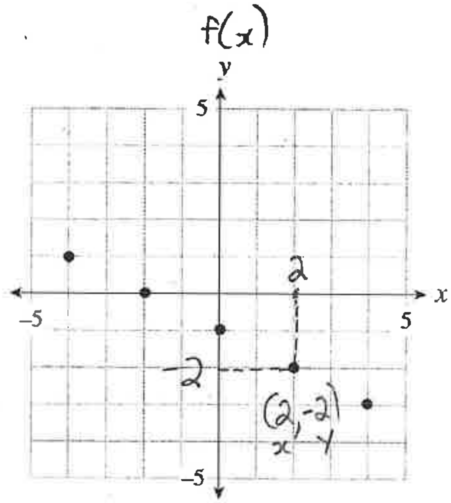
44. What is the **domain** and **range** of the following:



Domain: $x \leq 3$

Range: $y \in \mathbb{R}$ "all real #s"

Use the following graph to answer question 45



"y" = −2

45. **Determine the value of x if** $f(x) = -2$

what is the x value where "y" is −2?

$\boxed{x = 2}$ when f(x) is −2
"y"

46. The point $(6, k)$ is on a line that has a y-intercept of -2, and is **perpendicular** to the line $y = \frac{2}{3}x + 4$. What is the value of k?

flip and change sign

slope $= \frac{2}{3}$, ∴ slope of perp. is $\frac{-3}{2}$.

new line slope $= -\frac{3}{2}$, y-int is −2,

So eqn. is ($y = mx + b$) $y = \frac{-3}{2}x - 2$

x y

$y = -\frac{3}{2}x - 2$ through $(6, k)$

$k = -\frac{3}{2}(6) - 2$

$k = -9 - 2$

$k = -11$

$\boxed{k = -11}$

47. Carly and Joel buy some Hot Dogs and some Smoothies for their friends at the Saanich Fair. (1) Carly Bought 3 Hot Dogs and 4 Smoothies for a total of \$33.75. (2) Joel bought 5 Hot Dogs and 2 Smoothies for \$35.25. How much did it cost to buy one **Smoothie**?

let H = cost for one Hot Dog, let S = cost for one Smoothie

Carly ① $(3H + 4S = 33.75) \times -5$ } to get
Joel ② $(5H + 2S = 35.25) \times 3$ } −15H and 15H

① $-15H - 20S = -168.75$

⊕ ② $15H + 6S = 105.75$

$\frac{-14S}{-14} = \frac{-63}{-14}$

$S = 4.50$

One Smoothie costs \$4.50

48. What is $\left(\sqrt[4]{x^3}\right)\left(\sqrt[8]{x^{10}}\right)$ when written as a single power of x?

root power root power

use flower power!

$x^{\frac{y}{z}}$ ← power (flower) ← root

$= x^{\frac{3}{4}} \cdot x^{\frac{10}{8}}$ ← reduce!

$= x^{\frac{3}{4}} \cdot x^{\frac{5}{4}}$ ← multiply powers w/same base... ADD exponents!

$= x^{\frac{3}{4}+\frac{5}{4}} = x^{\frac{8}{4}} = \boxed{x^2}$

49. Janelle and Manny are standing on opposite sides of a cell phone tower. Janelle is standing 105m from the tower. Her angle of elevation to the tower is 23°. Manny's angle of elevation to the top of the tower is 36°. What is the **distance from Manny to the ~~[illegible]~~ base of the tower**? *Answer to one decimal place.*

find x!

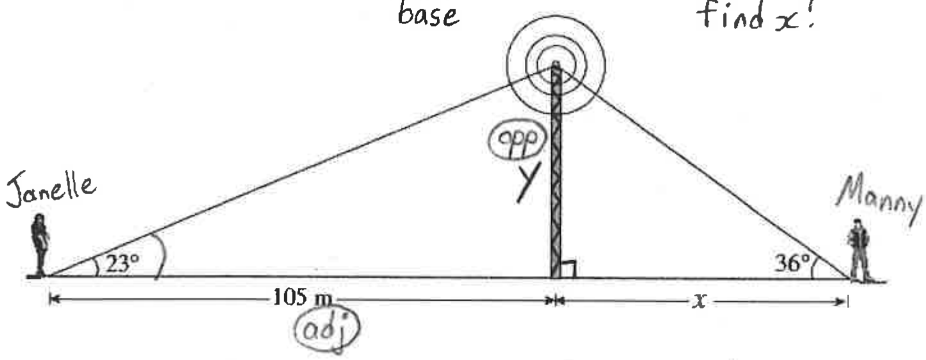
Find y: (ht. of tower)

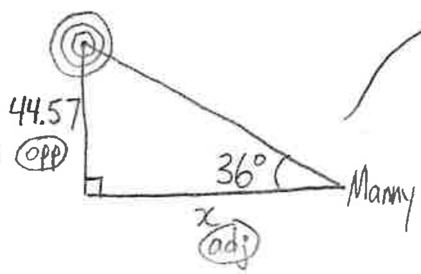
T O A, use tan!

$(\tan 23°) \times 105 = \left(\frac{y}{105}\right) \times 105$

$y = (\tan 23°) \times 105$

$y = 44.57$ m





T O A, use tan!

$\tan 36° = \frac{44.57}{x}$

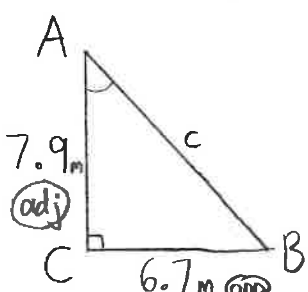
$x = \frac{44.57}{\tan 36°}$

$x = 61.3$ m

Distance from Manny to base of tower is 61.3m

50. Sketch and **solve** the following triangle ABC: *Angle C* = 90°, *side a* = 6.7*m*, *side b* = 7.9*m*

to nearest tenth



Find c: pythag!

$(7.9)^2 + (6.7)^2 = c^2$

$62.41 + 44.89 = c^2$

$107.3 = c^2$

$c = \sqrt{107.3}$

$c = 10.4$ m

find ∠A:

T O A, use tan!

$\tan^{-1} \tan A = \tan^{-1} \frac{6.7}{7.9}$

$\angle A = \tan^{-1}\left(\frac{6.7}{7.9}\right)$

$\angle A = 40.3°$

find ∠B:

$\angle B = 180° - 90° - 40.3°$

$\angle B = 49.7°$

Side c = 10.4 m
Angle A = 40.3°
Angle B = 49.7°

51. Pete earns an annual salary of $67 300. This year he will receive a 4% bonus. Scott earns $1040/week in wages and an average of $170 in tips per week. **Who earned more gross income this year**, and by how much?

Pete:

Bonus pay

4% of 67300 = 0.04×67300 = $2692

salary

+ $67300

$\boxed{\$69992}$

Scott:

$1040 + $170 = $1210/wk

$1210/wk × 52 weeks = $\boxed{\$62920}$

difference:

69992 − 62920 = $7072

Pete / Scott

$\boxed{\text{Pete earned more, by \$7072}}$

52. Janet's net pay is $1164 for a 35 hour week. Her personal annual taxes are $14 763, CPP is $2564 and EI is $836. What is her **gross** bi-weekly pay? What is her **gross pay per hour**?

gross = net + deductions

annual net pay = 1164 × 52 = $60,528

annual gross = 60,528 + 14763 + 2564 + 836 = $78691/year

Bi-weekly

Bi-weekly gross = 78691 ÷ 26 = $\boxed{\$3026.58}$

Hourly gross = 3026.58 ÷ 70 = $\boxed{\$43.24/hr}$

# of hours every 2 weeks (35×2)

Gross Bi-Weekly Pay: $3026.58

Gross Pay Per Hour: $43.24

53. Marco has a gross income of $47 000. He pays CPP and EI (both are tax deductible). His federal tax rate is 15% and his provincial tax rate is 5.06%. Calculate the **total tax he pays and** his **yearly net income.**

CPP = (47000 − 3500) × 0.0495 = $2153.25

EI = 47000 × 0.0163 = $766.10

+ $2919.35

Federal: 47000 − 11635 − 2919.35 = $32,445.65

fed. exemption / CPP, EI / federal taxable income

$32,445.65 × 0.15 = $\boxed{\$4866.85}$

Provincial: 47000 − 10207 − 2919.35 = $33873.65

prov. exemption / CPP, EI / prov. taxable income

33873.65 × 0.0506 = $\boxed{\$1714.01}$

Total Tax = $\boxed{4866.85}$ + $\boxed{1714.01}$ = $\boxed{\$6580.86}$

Total Tax: $6580.86

Yearly Net Income: $37,499.79

Net = 47000 (gross) − 6580.86 (taxes) − 2919.35 (deductions (CPP, EI)) =

(h, T)

54 A Plumbing company charges a fixed amount, plus an hourly rate for a service call. A two hour service call is \$145, and a four hour service call is \$255.

$(2, 145)$ $(4, 255)$

a. Write the equation that shows how the total cost, T, depends on the number of hours, h, and the fixed cost, C. Use R for hourly rate. think... $y = mx + b$

$$\boxed{T = Rh + C}$$

rate (like slope)

fixed cost... initial value (like y-intercept)

b. Find the hourly rate.

like finding slope... use $(\underset{x_1}{2}, \underset{y_1}{145})$ and $(\underset{x_2}{4}, \underset{y_2}{255})$

$$\text{slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{255 - 145}{4 - 2} = \frac{110}{2} = \boxed{\$55/\text{hr}}$$

hourly rate (R)

c. Find the fixed amount cost.

now,... $T = 55h + C$ use $(\underset{h}{2}, \underset{T}{145})$

$145 = 55(2) + C$

$145 = \cancel{110} + C$

$-110 \quad \cancel{-110}$

$35 = C$

$\boxed{C = \$35}$ Fixed cost

d. Write the equation that now describes this relation, and use it to find the total cost of 27 hours of work.

$T = Rh + C$

now... $\boxed{T = 55h + 35}$ equation

$h = 27$... $T = 55(27) + 35$

$\boxed{T = \$1520}$ cost of 27h

Equation: $T = 55h + 35$

Cost of 27 hours of work: \$1520

e. Find the domain and range:

(h) Domain: $\{0, 1, 2, 3, 4, 5, 6, 7, \ldots\}$

(T) Range: $\{35, 90, 145, 200, 255, 310, \ldots\}$

Fixed cost $\quad +55 \quad +55$

55. Determine the number of terms in this arithmetic sequence. (2 marks)

$a_1 = -10,\ d = 6,\ t_n = 146$

$t_n = a + (n-1)d$

$146 = -10 + (n-1)6$

$+10 \qquad +10$

$\frac{156}{6} = \frac{(n-1)6}{6}$

$26 = n - 1$

$+1 \qquad +1$

$27 = n$

The sequence has 27 terms

56. Determine the **45th** term for this arithmetic sequence. (2 marks)

6, 13, 20, … (+7, +7) $a = 6,\ d = 7,\ n = 45,\ t_{45} = ?$

$t_n = a + (n-1)d$

$t_{45} = 6 + (45-1)7$

$t_{45} = 6 + (44)7$

$t_{45} = 6 + 308$

$t_{45} = 314$

The 45^{th} term is 314