Math 0240 Final Exam Review Questions

1. Simplify: $24 \div 8 \cdot 3 + 28 \div (-7)$

PEMDAS

$3 \cdot 3 + 28 \div (-7)$

$9 + 28 \div (-7)$

$9 + -4$

$\boxed{5}$

2. Simplify: $\dfrac{11-(-9)+6(10-4)}{2+3\cdot 4}$

$\dfrac{11+9+6(6)}{2+3\cdot 4}$

$\dfrac{11+9+36}{2+12} \rightarrow \dfrac{20+36}{14} \rightarrow \dfrac{56}{14} \rightarrow \dfrac{14\cdot 4}{14}$

$\boxed{4}$

3. Simplify: $-3(-5x+7)-3(2-x)-8x-6$

$15x - 21 - 6 + 3x - 8x - 6$

$10x - 21 - 6 - 6$

$\boxed{10x - 33}$

4. Simplify: $30\left(\frac{1}{5}x - \frac{4}{3}\right) + 30\left(\frac{3}{10}\right)$

$\frac{30\cdot 1}{5}x - \frac{30\cdot 4}{3} + \frac{30\cdot 3}{10}$

$6\cdot 1x - 10\cdot 4 + 3\cdot 3$

$6x - 40 + 9 \rightarrow \boxed{6x - 31}$

In #5 – 11, Simplify the expressions. Each variable should only occur once, and exponents should be positive in your final answer. Evaluate exponents, if applicable.

5. $3x^{-6}$

$3 \cdot x^{-6} \rightarrow \boxed{\dfrac{3}{x^6}}$

6. $(3x^3)^{-2}$

$3^{-2} \cdot (x^3)^{-2}$

$3^{-2} \cdot x^{-6} \rightarrow \dfrac{1}{3^2 x^6} \rightarrow \boxed{\dfrac{1}{9x^6}}$

7. $(3x^{-3})^2$

$3^2 (x^{-3})^2$

$3^2 x^{-6} \rightarrow \dfrac{3^2}{x^6} \rightarrow \boxed{\dfrac{9}{x^6}}$

8. $5^{-3} \rightarrow \dfrac{1}{5^3}$ 5·5·5

$\boxed{\dfrac{1}{125}}$

9. $\left(\frac{4}{7}\right)^{-2}$

$\dfrac{4^{-2}}{7^{-2}} \rightarrow \dfrac{7^2}{4^2} \rightarrow \boxed{\dfrac{49}{16}}$

10. $\left(\frac{x^7}{x^2}\right)^3$

$(x^5)^3 \rightarrow \boxed{x^{15}}$

11. $\left(\frac{b^{10}}{b^3}\right)^{-2}$

$(b^7)^{-2} \rightarrow b^{-14} \rightarrow \boxed{\dfrac{1}{b^{14}}}$

12. Evaluate $x^2 - 4xy - y^2$ when $x = -2$ and $y = 3$

$(-2)^2 - 4(-2)(3) - (3)^2$

$4 + 24 - 9 \rightarrow 28 - 9$

$\boxed{19}$

In #13 and 14, write each of the numbers in decimal notation. Also called standard notation.

13. 3.113×10^{-5}

5 places ←

$\boxed{0.00003113}$

14. 1.201×10^{9}

9 places →

$\boxed{1,201,000,000}$

In #15 and 16, write each of the numbers in Scientific Notation.

15. 87,000,000

$\boxed{8.7 \times 10^{7}}$

16. 0.000017

$\boxed{1.7 \times 10^{-5}}$

In #17 – 19, Solve & check each equation.

17. $2(x-3)+5x=8(x-1)$

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

$7x-6=8x-8$

$-7x \quad -7x$

$-6=x-8$

$+8 \quad +8$

$2=x$ $\boxed{x=2}$

$2(2-3)+5\cdot2=8(2-1)$

$2(-1)+10 \quad 8(1)$

$-2+10$

$8=8$ ✓

18. $\left(\frac{2x}{3}+\frac{1}{5}\right)=\left(1+\frac{3x}{5}-\frac{1}{3}\right)^{15}$

$15\cdot\frac{2x}{3}+15\cdot\frac{1}{5}=15\cdot1+15\cdot\frac{3}{5}x-15\cdot\frac{1}{3}$

$10x+3=15+9x-5$

$10x+3=9x+10$

$-9x \quad -9x$

$1x+3=10$

$-3 \quad -3$

$\boxed{x=7}$

19. $\frac{x+2}{3}=\frac{x}{6}$

$6\cdot\frac{(x+2)}{3}=6\cdot\frac{x}{6}$

$2(x+2)=x$

$2x+4=1x$

$-2x \quad -2x$

$4=-1x$

$\frac{4}{-1}=\frac{-1x}{-1}$

$\boxed{x=-4}$

For #20 – 25, define a variable in words, write an equation or inequality, solve algebraically, and write your answer in a complete sentence.

20. Seven subtracted from five times a number is 208. Find the number.

Let x = the number

$5x-7=208$

$+7 \quad +7$

$5x=215$

$\frac{5x}{5}=\frac{215}{5}$

$x=\frac{43\cdot5}{5}$

$x=43$

The number is 43.

21. An 87-inch board is cut into three pieces. The longest piece is 10 inches longer than twice the shortest piece and the middle-sized piece is 17 inches longer than the shortest piece. How long are the pieces?

x	x+17	2x+10

87 inches

Let x = length of short piece (inches)

$x+(x+17)+(2x+10)=87$

$4x+27=87$

$-27 \quad -27$

$4x=60$

$\frac{4x}{4}=\frac{60}{4}$ $\boxed{x=15}$

$15 \quad 15+17 \quad 2\cdot15+10$

$32 \quad 40$

Shortest piece → 15 in
middle piece → 32 in
Longest piece → 40 in.

22. A landscape architect charged a customer $971, listing $350 for plants and the remainder for labor. If the architect charged $23 per hour, how many hours did the architect work?

Let x = # of hours

Total Cost = Cost plants + Cost Labor

$971=350+23\cdot x$

$-350 \quad -350$

$621=23x$

$\frac{23x}{23}=\frac{621}{23}$ $\boxed{x=27}$

The architect worked for 27 hours.

23. A university with 176 people on the faculty wants to maintain a student-to-faculty ratio of 23:2. How many students should they enroll to maintain that ratio?

Proportion

$\frac{23 \text{ students}}{2 \text{ faculty}}=\frac{x \text{ students}}{176 \text{ faculty}}$

$23(176)=2x$

$\frac{23\cdot176}{2}=\frac{2x}{2}$

$x=2024$

The university could enroll 2024 students.

24. To earn a B in a course, a student must have a final average of at least 80%. On the first three examinations, a student has scores of 76%, 74%, and 78%. What must the student earn on the fourth examination to earn a B in the course?

Let x = score needed on Exam 4

Exam scores: 76, 74, 78, x

Average of 4 scores: $\frac{76+74+78+x}{4}$

$\frac{228+x}{4}$

Average ≥ 80

$4 \cdot \frac{(228+x)}{4} \geq 80 \cdot 4$

$228+x \geq 320$

$-228 \quad -228$

$x \geq 92$

They must score 92% or better on Exam 4.

25. A motorcycle traveling at 50 mph overtakes a car traveling at 30 mph that had a three-hour head start. How far from the starting point are the two vehicles? (Distance = Rate*Time)

Let x = # of hours on motorcycle

	Rate · Time = Distance
Motorcycle	$50 \cdot x = 50x$
car	$30 \cdot (x+3) = 30(x+3)$

They made equal Distances

$50x = 30(x+3)$

$50x = 30x + 90$

$-30x \quad -30x$

$20x = 90$

$x = \frac{90}{20} = 4.5$

Distance traveled: $50\frac{mi}{hr} \cdot 4.5\,hr$

225 miles

In #26 – 28, solve each inequality. Write the solution in interval notation and graph it on a number line.

26. $10 < -2x + 4$

$-4 \quad -4$

$6 < -2x$

* flip $\frac{6}{-2} > \frac{-2x}{-2}$

$-3 > x \quad x < -3$

Interval Notation: $(-\infty, -3)$

27. $33x + 33 \geq 3(4x + 3)$

$33x + 33 \geq 12x + 9$

$-12x \quad -12x$

$21x + 33 \geq 9$

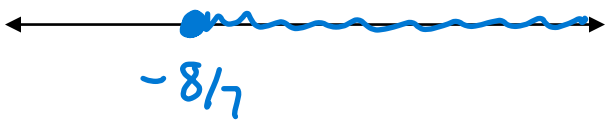
$-33 \quad -33$

$21x \geq -24$

$\frac{21x}{21} \geq \frac{-24}{21}$

$x \geq \frac{-8 \cdot 3}{7 \cdot 3}$

Interval Notation: $[-8/7, \infty)$



28. $-24 < 3x - 6 \leq -15$

Isolate x in the middle

$+6 \quad +6 \quad +6$

$-18 < 3x \leq -9$

$\frac{-18}{3} < \frac{3x}{3} \leq \frac{-9}{3}$

$-6 < x \leq -3$

Interval Notation: $(-6, -3]$

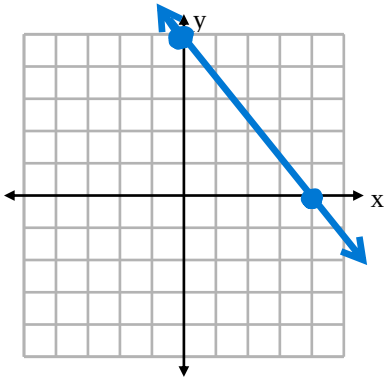
29. Graph the line $5x + 4y = 20$ by finding its *x*- and *y*- intercepts. Write your intercepts as ordered pairs.

x-int
set y=0
$5x+4(0)=20$
$5x=20$
$\frac{5x}{5}=\frac{20}{5}$
$x=4$
(4,0)

y-int
set x=0
$5(0)+4y=20$
$\frac{4y}{4}=\frac{20}{4}$
$y=5$
(0,5)

x-intercept: (4,0)

y-intercept: (0,5)



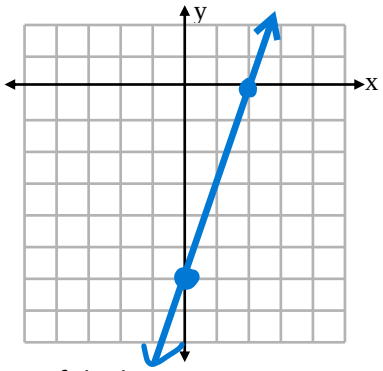
30. Graph the line $y = 3x - 6$ by finding its *x*- and *y*- intercepts. Write your intercepts as ordered pairs.

x-int
set y=0
$0=3x-6$
$+6 \quad +6$
$6=3x$
$\frac{6}{3}=\frac{3x}{3}$
$2=x$ (2,0)

y-int
set x=0
$y=3\cdot0-6$
$y=-6$
(0,-6)

x-intercept: (2,0)

y-intercept: (0,-6)



In #31 – 33, solve each linear equation for *y*, then determine the slope and *y*-intercept of the line.

31. $4x + 3y = 6$

$-4x \quad -4x$
$3y=-4x+6$
$\frac{3y}{3}=\frac{-4x}{3}+\frac{6}{3}$
$y=-\frac{4}{3}x+2$
slope: $-4/3$
y-int: (0,2)

32. $3x - 2y = 5$

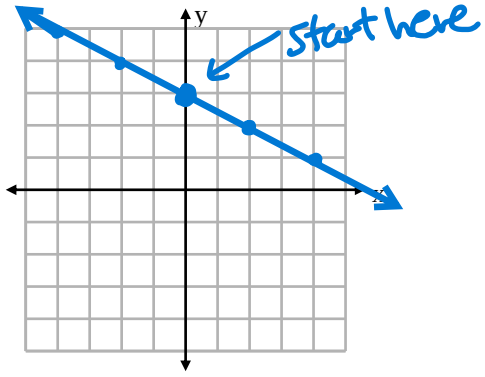
$-3x \quad -3x$
$-2y=-3x+5$
$\frac{-2y}{-2}=\frac{-3x}{-2}+\frac{5}{-2}$
$y=\frac{3}{2}x-\frac{5}{2}$
slope: $3/2$
y-int: $(0,-5/2)$

33. $5y - 8x = 30$

$+8x \quad +8x$
$5y=8x+30$
$\frac{5y}{5}=\frac{8x}{5}+\frac{30}{5}$
$y=\frac{8}{5}x+6$
slope: $8/5$
y-int: (0,6)

34. Use the slope and *y*-intercept to sketch $y = -\frac{1}{2}x + 3$.

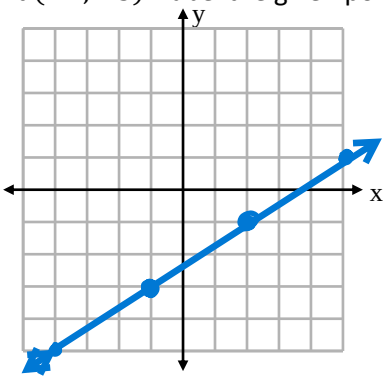
y-int (0,3)
$m=\frac{-1}{2}$ down Right
or
$m=\frac{1}{-2}$ up left



35. Sketch the line with slope, $m = \frac{2}{3}$, that contains the point $(-1, -3)$. Label the given point and at least 2 other points on the line.

start at $(-1,-3)$

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



36. Write the equation for the line which passes through $(-2, 5)$, and is parallel to the line $y = 3x - 2$.

$y = mx + b$

this line has slope, 3. Then so does our line, since parallel.

① Find m: $m = 3$

② Find b: $y = 3x + b$

$5 = 3(-2) + b$

$5 = -6 + b$

$+6 \quad +6$

$b = 11$

$y = 3x + 11$

37. Write the equation for the line which passes through the points $(3, -4)$ and $(5,0)$.

$y = mx + b$

① Find m: $m = \frac{0-(-4)}{5-3} = \frac{4}{2}$

$m = 2$

② Find b: use either point to find b.

$y = 2x + b$

$0 = 2(5) + b$

$0 = 10 + b$

$-10 \quad -10$

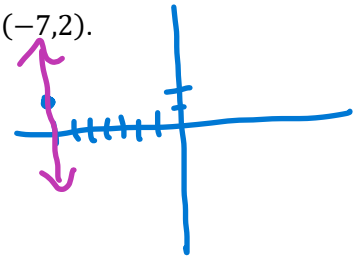
$-10 = b$

$y = 2x - 10$

38. Write the equation for the line with undefined slope which passes through the point $(-7,2)$.

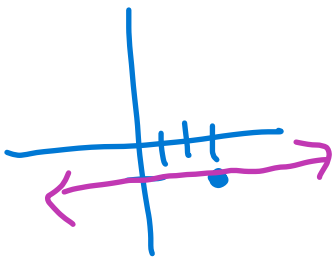
this line is Vertical

$x = -7$



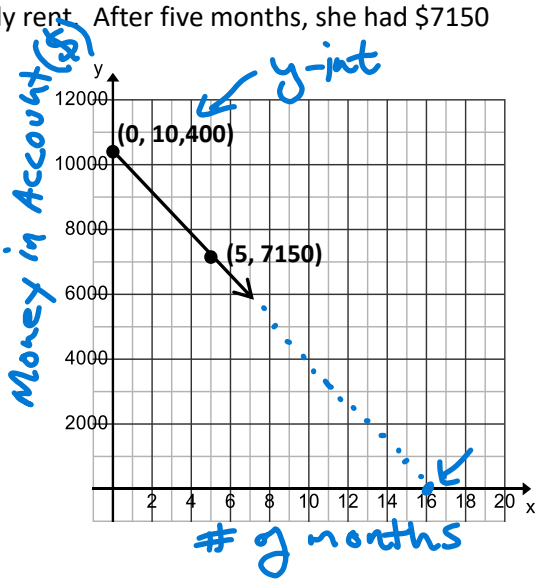
39. Find an equation for the line which is parallel to the line $y = -2$, and passes through the point $(3, -1)$.

this is a horizontal line. Our line is also horizontal, since parallel.



$y = -1$

40. Sunny had $10,400 in her bank account that she used just for her monthly rent. After five months, she had $7150 in her account.



a. Give the slope of the given line, including units.

$m = \frac{10400-7150\ (\$)}{0-5\ \text{months}} = \frac{3250}{-5}\ \frac{\$}{\text{month}}$

$-650\ \frac{\$}{\text{month}}$

b. What does the slope mean as a rate of change for Sunny's account?

Amount in Account Decreases by $650/month. (She pays $650/month Rent)

c. Write an equation for the line that models the amount in Sunny's account.

$y = -650x + 10{,}400$

d. Assuming she never adds any more money into the account, when will she run out of money?

Let $y=0$

$0 = -650x + 10400$

$650x = 10400$

$x = \frac{10400}{650} = 16$

She will run out of money after 16 months.

In #41 – 46, perform the indicated operation(s) and simplify the result.

41. $(-2x^2y + 9xy + xy^2 + 21) + (-4xy + 3xy^2 - 11)$

$-2x^2y + 9xy + xy^2 + 21$

$-4xy + 3xy^2 - 11$

$-2x^2y + 5xy + 4xy^2 + 10$

42. $(9x^2 - 8x + 5) - (6x^2 - 7x - 1)$

$9x^2 - 8x + 5$

$-6x^2 + 7x + 1$

$3x^2 - x + 6$

43. $(3a + 7)(2a - 5)$ FOIL

$6a^2 - 15a + 14a - 35$

$6a^2 - a - 35$

44. $(2x + 7y)^2$

$(2x + 7y)(2x + 7y)$

$4x^2 + 14xy + 14xy + 49y^2$

$4x^2 + 28xy + 49y^2$

45. $3x(x + 4)(x - 4)$

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

$3x(x^2 - 16)$

$3x^3 - 48x$

46. $(x + 3)^2 + (x + 3)(x - 3)$

$(x+3)(x+3) + (x+3)(x-3)$

$x^2 + 3x + 3x + 9 + (x^2 - 3^2)$

$x^2 + 6x + 9 + (x^2 - 9)$

$2x^2 + 6x$

In #47 – 52, completely factor each polynomial, including factoring out the Greatest Common Factor. If not factorable, state that it is PRIME.

47. $t^2 + 2t - 15$

product -15, sum +2, +5, -3

$(t+5)(t-3)$

48. $m^2 - 12m + 36$

product 36, sum -12, -6, -6

$(m-6)(m-6)$ or $(m-6)^2$

49. $9p^2 - 100$

$(3p)^2 - 10^2$

2 terms ✓ subtracted ✓ perfect squares ✓

$(3p+10)(3p-10)$

50. $4x^2 + 36$

GCF: 4 $\quad 4(x^2+9)$

sum of squares. cannot be factored further

51. $r^2 + r + 2$

product +2, sum +1

This is impossible

PRIME

52. $2x^3 + 8x^2 + 6x$

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

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

53. Simplify each expression. Leave your answer in the form of a simplified radical, if necessary.

a. $\sqrt{6} \cdot \sqrt{54}$

$\sqrt{6 \cdot 54}$

$\sqrt{6 \cdot 6 \cdot 9}$

$\sqrt{36}\sqrt{9}$

$6 \cdot 3 \rightarrow 18$

b. $\sqrt{6} + \sqrt{54}$

$1\sqrt{6} \quad \sqrt{9 \cdot 6}$

$\sqrt{9}\sqrt{6}$

$1\sqrt{6} + 3\sqrt{6}$

$4\sqrt{6}$

c. $\sqrt{25 - 16}$

$\sqrt{9}$

3

d. $\sqrt{25} - \sqrt{16}$

$5 - 4$

1

54. Use rules for square roots to simplify the expression. Do not use a calculator to approximate an answer.

a. $\sqrt{72}$

$\sqrt{36 \cdot 2}$

$\sqrt{36}\sqrt{2}$

$6\sqrt{2}$

b. $\sqrt{900a^{10}b^4}$

$\sqrt{(30a^5b^2)^2}$

$30a^5b^2$

OR $\sqrt{900}\sqrt{a^{10}}\sqrt{b^4}$

$30a^5b^2$

c. $\sqrt{40x^5y^8}$

$\sqrt{4 \cdot 10 \cdot x^4 \cdot x \cdot y^8}$

$\sqrt{4}\sqrt{10}\sqrt{x^4}\sqrt{x}\sqrt{y^8}$

$2x^2y^4\sqrt{10x}$

d. $\frac{\sqrt{45h^7}}{\sqrt{5h^3}} \rightarrow \sqrt{\frac{45h^7}{5h^3}}$

$\sqrt{9h^4}$

$\sqrt{(3h^2)^2}$

$3h^2$

55. Use factoring to solve each equation.

a. $9x^2 - 25 = 0$

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

$(3x-5)(3x+5) = 0$

$3x-5=0$ or $3x+5=0$

$3x=5$ $\quad 3x=-5$

$x = 5/3$ or $x = -5/3$

b. $x(x-3) = 10$

$x^2 - 3x = 10$

$x^2 - 3x - 10 = 0$

$(x-5)(x+2) = 0$

$x-5=0$ or $x+2=0$

$x=5$ or $x=-2$

c. $2x^3 + 10x^2 + 12x = 0$

$2x(x^2+5x+6) = 0$

$2x(x+2)(x+3) = 0$

$2x=0$ or $x+2=0$ or $x+3=0$

$x=0$, $x=-2$ or $x=-3$

56. Use the Square Root Property to solve each equation. Give exact, simplified solutions.

a. $9x^2 - 25 = 0$

$9x^2 = 25$

$x^2 = \frac{25}{9}$

$x = \sqrt{\frac{25}{9}}$ or $x = -\sqrt{\frac{25}{9}}$

$x = \frac{5}{3}$ or $x = -\frac{5}{3}$

b. $(x-2)^2 = 16$

$x-2 = \sqrt{16}$ or $x-2 = -\sqrt{16}$

$x-2 = 4$ or $x-2 = -4$

$+2\ +2$ $\quad +2\ +2$

$x = 6$ or $x = -2$

c. $\frac{2(x+5)^2}{2} = \frac{6}{2}$

$(x+5)^2 = 3$

$x+5 = \sqrt{3}$ or $x+5 = -\sqrt{3}$

$-5\ -5$ $\quad -5\ -5$

$x = -5+\sqrt{3}$ or $x = -5-\sqrt{3}$

57. Use the Quadratic Formula to solve each equation. Give exact, simplified solutions.

$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

a. $6x^2 - x - 1 = 0$

$a=6$ $\quad b=-1$ $\quad c=-1$

$x = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(6)(-1)}}{2(6)}$

$x = \frac{1 \pm \sqrt{1+24}}{12}$ $\quad x = \frac{1 \pm \sqrt{25}}{12}$

$x = \frac{1+5}{12}$ or $x = \frac{1-5}{12}$

$x = 6/12$ or $x = -4/12$

$x = 1/2$ or $x = -1/3$

b. $t^2 = t + 4$

$t^2 - t - 4 = 0$

$a=1$ $\quad b=-1$ $\quad c=-4$

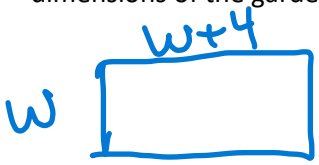
$t = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(1)(-4)}}{2(1)}$

$t = \frac{1 \pm \sqrt{1+16}}{2}$

$t = \frac{1 \pm \sqrt{17}}{2}$

58. The length of a rectangular garden is 4 feet longer than the width. If the area of the garden is 140 sq. feet, find the dimensions of the garden.

$l \to w+4$



$l \cdot w = 140$

$(w+4)w = 140$

$w^2 + 4w = 140$

$w^2 + 4w - 140 = 0$

$(w+14)(w-10) = 0$

$w+14=0$

$w=-14$

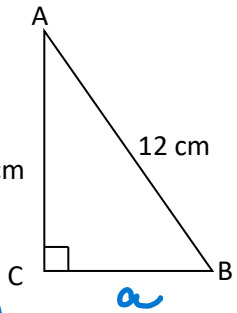
$w-10=0$

$w=10$

width $\to$ 10 ft

length $\to$ 14 ft

59. Use the Pythagorean Theorem to find the length of side BC on the right triangle below. Leave your answers in simplified radical form. Assume all units are in centimeters.



$a^2 + 10^2 = 12^2$

$a^2 + 100 = 144$

$-100\ \ -100$

$a^2 = 44$

$a = \sqrt{44}$ or $a = -\sqrt{44}$

$a = \sqrt{4 \cdot 11}$

$a = \sqrt{4}\sqrt{11}$

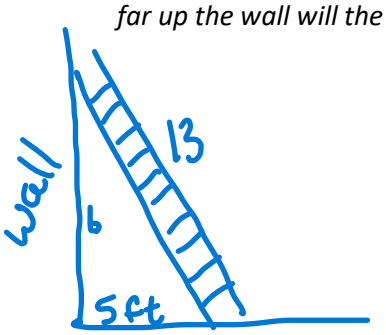
$a = 2\sqrt{11}$ cm

10 cm

60. Solve the following problem by

A)defining a variable, B)writing an equation, C)solving the equation and D) answering the question in context.

A 13-foot ladder, leaning against a wall, is set with the bottom of the ladder 5 feet from the base of the wall. How far up the wall will the ladder reach?



$5^2 + b^2 = 13^2$

$25 + b^2 = 169$

$-25 \quad -25$

$b^2 = 144$

$b = \sqrt{144}$ or $b = -\sqrt{144}$

$b = 12$

The ladder reaches 12 ft up the wall.

61. Solve each formula for the given variable.

a. Solve for w: $P = 2l + 2w$

$-2l \quad -2l$

$P - 2l = 2w$

$\frac{P-2l}{2} = \frac{2w}{2}$

$w = \frac{P-2l}{2}$

OR

$\frac{P}{2} - \frac{2l}{2} = \frac{2w}{2}$

$w = \frac{P}{2} - l$

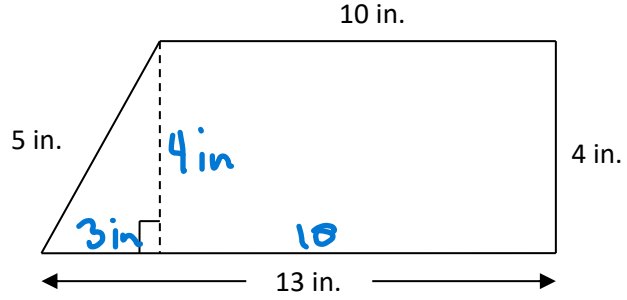
b. Solve for *h*: $A = \frac{1}{2}bh$

$2 \cdot A = 2 \cdot \frac{1}{2} \cdot b \cdot h$

$\frac{2A}{b} = \frac{bh}{b}$

$h = \frac{2A}{b}$

62. Find the area and perimeter of the figure.



Area

Area of Triangle + Area Rectangle

$\frac{1}{2} \cdot 3 \cdot 4 + 4 \cdot 10$

$6 + 40$

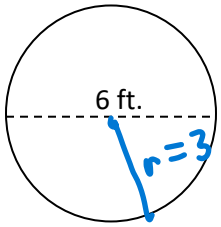
46 in^2

Perimeter

$5 + 10 + 4 + 13$

32 inches

63. Find the circumference and area of the following circle. Leave your answer in terms of π. $A = \pi r^2, C = 2\pi r$



Area

$A = \pi \cdot 3^2$

$A = 9\pi \text{ ft}^2$

Circumference

$C = 2 \cdot \pi \cdot r$

$C = 2 \cdot \pi \cdot 3$

$C = 6\pi \text{ ft}$

64. Solve the proportion: $\frac{a}{a+12} = \frac{4}{7}$

$7a = 4(a+12)$

$7a = 4a + 48$

$-4a \quad -4a$

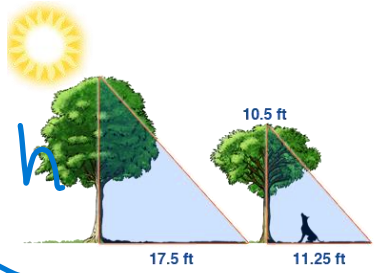
$3a = 48$

$\frac{3a}{3} = \frac{48}{3}$

$a = 16$

65. Given the lengths of the shadows of each tree as well as the height of the smaller tree, find the height of the taller tree.

Similar Triangles



height / shadow: $\frac{h \text{ ft}}{17.5 \text{ ft}} = \frac{10.5 \text{ ft}}{11.25 \text{ ft}}$

$11.25h = 10.5(17.5)$

$h = \frac{10.5(17.5)}{11.25}$

$h = 16\frac{1}{3}$ ft or 16 ft, 4 in

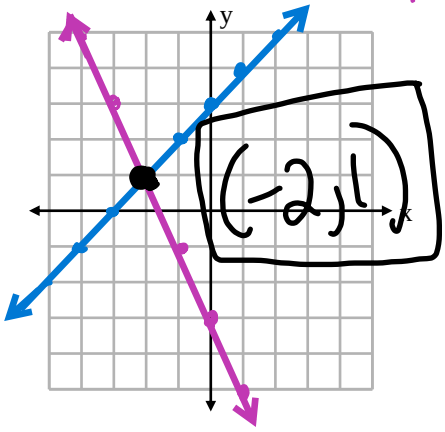
66. Solve each system of equations by graphing.

a. $\begin{cases} y = x + 3 \\ 2x + y = -3 \end{cases}$

$y = x + 3$ (0,3) $m = \frac{1}{1}$

$y = -2x - 3$

(0,-3) $m = -2$



b. $\begin{cases} 2y = 3x + 2 \\ 3x - 2y = 6 \end{cases}$

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

$y = \frac{3}{2}x + 1$

(0,1)

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

$3x - 2y = 6$

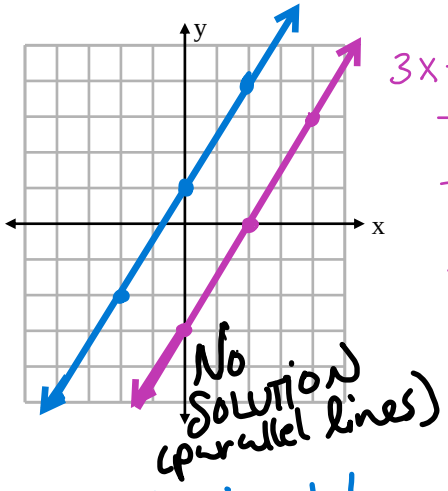
$-2y = -3x + 6$

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

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

(0,-3)

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



c. $\begin{cases} 3x - y = -3 \\ y - 3x = 3 \end{cases}$

$3x - y = -3$

$-3x \quad -3x$

$-y = -3x - 3$

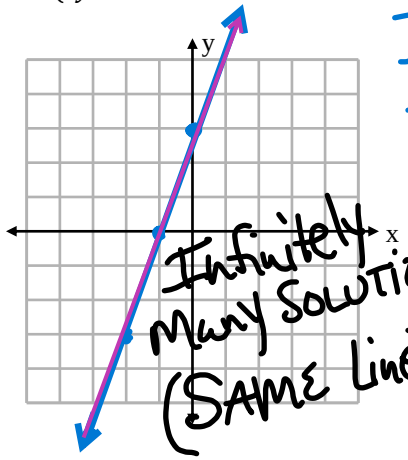
$\frac{-1y}{-1} = \frac{-3x}{-1} - \frac{3}{-1}$

$y = 3x + 3$

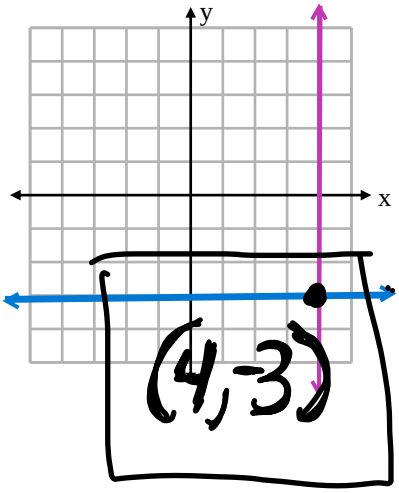
(0,3) $m = 3$

$y - 3x = 3$

$y = 3x + 3$



d. $\begin{cases} y = -3 \leftarrow \text{horizontal} \\ x = 4 \leftarrow \text{vertical} \end{cases}$



In #67 – 70, Solve each system using the substitution method. If there is *No Solution,* or *Infinitely Many Solutions*, so state.

67. $\begin{cases} 3x + 2y = 3 \\ y = 2x - 16 \end{cases}$

$3x+2(2x-16)=3$

$3x+4x-32=3$

$7x-32=3$

$+32 \quad +32$

$7x=35$

$x=\frac{35}{7}$

$x=5$

$y=2(5)-16$

$y=10-16$

$y=-6$

$(x,y)=(5,-6)$

68. $\begin{cases} 2x - y = -4 \\ 2y = 4x - 6 \end{cases}$

$\frac{2}{2} \quad \frac{2}{2} \quad \frac{2}{2}$

$y=2x-3$

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

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

$3 \neq -4$

NO SOLUTION

69. $\begin{cases} 3x + y = -7 \\ x + 2y = -9 \end{cases}$

$y=-3x-7$

$x+2(-3x-7)=-9$

$x-6x-14=-9$

$-5x=5$

$x=-1$

$-1+2y=-9$

$2y=-8$

$y=-4$

$(x,y)=(-1,-4)$

70. $\begin{cases} x + 3y = 6 \\ y = -\frac{1}{3}x + 2 \end{cases}$

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

$x+3\cdot-\frac{1}{3}x+3\cdot2=6$

$1x+-1x+6=6$

$6=6$

INFINITELY MANY SOLUTIONS

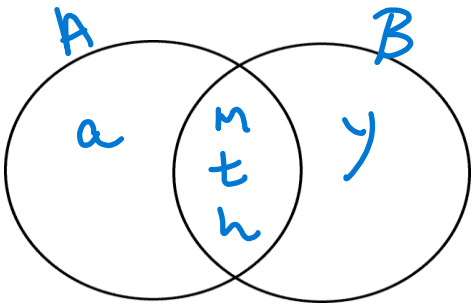
71. Given the sets $A=\{m,a,t,h\}$, $B=\{m,y,t,h\}$, $C=\{f,u,n\}$, find the following:

a. $A \cup B =$ $\{m,a,t,h,y\}$ union

b. $A \cap B =$ $\{m,t,h\}$ intersect

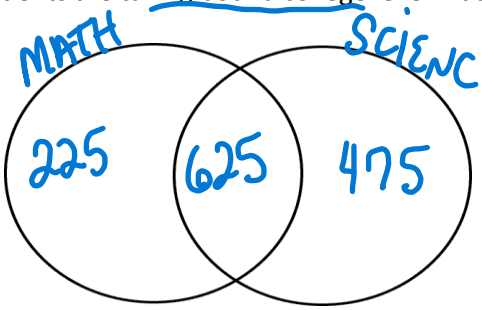
c. $A \cap C =$ $\emptyset$ Empty Set

d. Fill in the Venn Diagram using A and B



72. We have information for the number of students at ARCC taking a college level math class, and the number of students at ARCC taking a science course. Use a Venn diagram to illustrate the number that are in each region. We know 850 students are taking a college level math class, 1100 students are taking a science course, and 625 students are taking both a college level math class and a science course.

Intersection



850 − 625 = 225

1100 − 625 = 475

a. The number of people taking a college level math class, but not a science course is 225.

b. Suppose we want to mail scholarship information to all of the individuals who are taking a college level math course or taking a science course or both but we don't want anyone to receive two mailings. How many mailings do we need to send so that each person receives only one mailing?

225 + 625 + 475 → 1325 mailings

73. A class was polled on their favorite season of the year. Use the following table to finish the pie chart (title, percentages, label each portion)

Winter	Spring	Summer	Fall
4	3	12	6

4+3+12+6

Title: FAVORITE SEASON

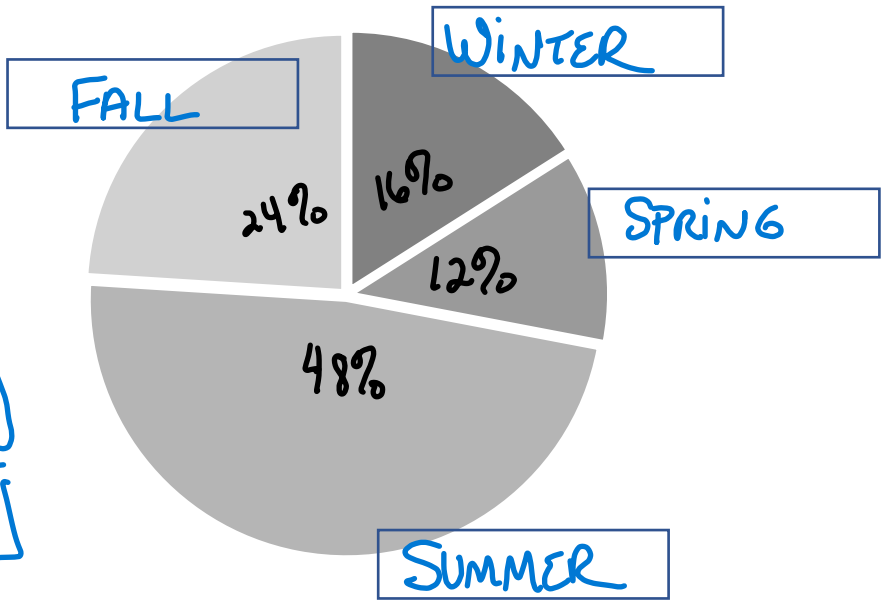
Total Number of Students: 25

% Winter: $\frac{4}{25} \cdot \frac{4}{4} \rightarrow \frac{16}{100} \rightarrow 16\%$

% Spring: $\frac{3}{25} \cdot \frac{4}{4} \rightarrow \frac{12}{100} \rightarrow 12\%$

% Summer: $\frac{12}{25} \cdot \frac{4}{4} \rightarrow \frac{48}{100} \rightarrow 48\%$

% Fall: $\frac{6}{25} \cdot \frac{4}{4} \rightarrow \frac{24}{100} \rightarrow 24\%$



74. Twelve car salespersons were asked how many cars they sold in the last month. Here were their answers:

3, 3, 4, 6, 6, 6, 8, 8, 10, 11, 12, 24

a. Find the range, mean, median of the number of cars sold

Range
$24 - 3$
21 cars

mean
$\frac{3+3+4+6+6+6+8+8+10+11+12+24}{12}$
$\frac{101}{12} \approx$ 8.42 cars

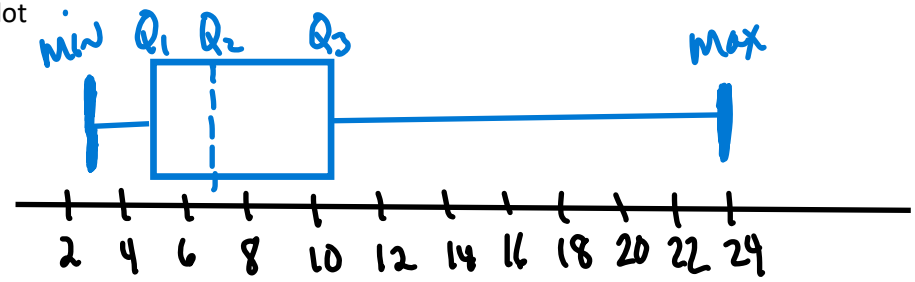
Median
$\frac{6+8}{2} \rightarrow \frac{14}{2} \rightarrow 7$
7 cars

b. Give the 5-number summary:
Min. value: 3 Q_1: 5 Median, Q_2: 7 Q_3: 10.5 Max. value: 24

3 3 4 6 6 6
$\frac{4+6}{2} \rightarrow 5$

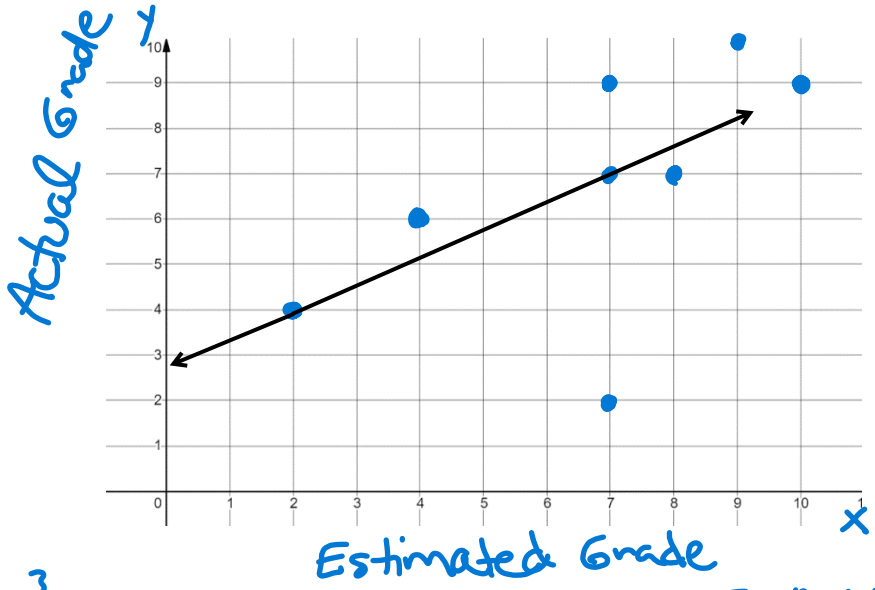
8 8 10 11 12 24
$\frac{10+11}{2} \rightarrow 10.5$

c. Draw the box plot



75. Eight students were asked to estimate their score on a 10-point quiz. Their estimated and actual scores are given in the table. Draw a scatter plot of the data, then use two convenient points to draw a line of best fit. Give the equation for your line. $y = mx + b$

Estimated x	Actual y
4	6
7	7
7	2
8	7
7	9
9	10
10	9
2	4



I will use (2,4) and (7,7).

① Find m $m = \frac{7-4}{7-2} = \frac{3}{5}$

② Find b. $y = \frac{3}{5}x + b$

$4 = \frac{3}{5} \cdot 2 + b$

$4 - \frac{6}{5} = b$

$b = \frac{14}{5}$

$y = \frac{3}{5}x + \frac{14}{5}$

Answers may vary if you use different points.