

Practice Test 2, Section 3

Explanations

1. B

The absolute value of an expression is always positive, so in order to get a negative answer it is necessary to subtract a positive number from it. Only choice B does that.

2. B

Solve for y in the equation below since there's no x -term

$$2(y+4) = 16$$

$$\begin{array}{r} 2y + 8 = 16 \\ -8 \quad -8 \\ \hline \end{array}$$

$$2y = 8$$

$$\begin{array}{r} 2y = 8 \\ -2 \quad -2 \\ \hline \end{array}$$

$$y = 4$$

3. C

$$f(x) = \frac{2}{3}x + b$$

To solve for $f(-1)$, we need to know what b is.

Use $f(3) = 7$ to solve for b .

$$7 = \frac{2}{3}(3) + b$$

$$7 = 2 + b$$

$$5 = b$$

Now, we know

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

We can evaluate $f(-1)$

$$f(-1) = \frac{2}{3}(-1) + 5$$

$$= -\frac{2}{3} + 5$$

get common denominators

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

$$= -\frac{2}{3} + \frac{15}{3}$$

$$= \boxed{\frac{13}{3}}$$

4. A

$f(x) = -2x + 9$
 To evaluate $f(-5x)$,
 substitute $-5x$ in for x .

$$f(-5x) = -2(-5x) + 9$$

$$= \boxed{10x + 9}$$

5. D

$$4(3x+2)(x+1)$$

$$(12x+8)(x+1)$$

$$12x^2 + 12x + 8x + 8$$

$$12x^2 + 20x + 8$$

6. C

Pick #s

$$\frac{13-8}{b} = \frac{5}{8}$$

$\nwarrow$
8

Try Ans. choices

$$A. \frac{13}{8} = \frac{21}{8} \times$$

$$B. \frac{13}{8} = \frac{14}{8} \times$$

$$C. \frac{13+8}{8} = \frac{21}{8} \checkmark$$

$$D. \frac{13-8}{8} = -\frac{1}{8} \times$$

7. B

Week 3, 9 miles

Week 15, 27 miles

avg rate of change
 (similar to slope)

$$\frac{27-9}{15-3} = \frac{18}{12} = \frac{3}{2} \text{ or } 1.5$$

$$\frac{3 \text{ miles}}{2 \text{ wks}} \text{ or } 1.5 \frac{\text{miles}}{\text{wk}}$$

8. B

Parallel $\rightarrow$ same slope

$$y = -6x + 5$$

 $\uparrow$ slope = -6

Solve each Ans for y to find each slope

A) $6x + 2y = 8$

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

$$y = -3x + 4$$

$$m = -3 \quad \times$$

B) $18x + 3y = 4$

$$3y = -18x + 4$$

$$y = -6x + \frac{4}{3}$$

$$m = -6 \quad \checkmark$$

C) $3x - y = 10$

$$-y = -3x + 10$$

$$y = 3x - 10$$

$$m = 3 \quad \times$$

D) $x + 12y = 0$

$$12y = -x$$

$$y = -\frac{x}{12}$$

$$m = -\frac{1}{12} \quad \times$$

9. A

$$\sqrt{x-a} = \frac{1}{2}x - 6$$

$$a = 4$$

$$\sqrt{x-4} = \frac{1}{2}x - 6$$

Try the Ans. choices

$$\sqrt{20-4} = \frac{1}{2}(20) - 6$$

$$\sqrt{16} = 10 - 6$$

$$4 = 4 \quad \checkmark$$

20 works, so it could be A or B.

We have to check if 8 also works.

$$\sqrt{x-a} = \frac{1}{2}x - 6$$

$$\sqrt{8-4} = \frac{1}{2}(8) - 6$$

$$\sqrt{4} = 4 - 6$$

$$2 = -2 \quad \times$$

8 doesn't work, so

A is the answer.

10. A

$$\frac{t+7}{t-7} = 14$$

Write 14 as $\frac{14}{1}$ and
cross multiply

$$\frac{t+7}{t-7} = \frac{14}{1}$$

$$t+7 = 14(t-7)$$

$$t+7 = 14t - 98$$

$$\begin{array}{r} -t \quad -t \\ \hline 7 = 13t - 98 \\ +98 \quad +98 \\ \hline 105 = 13t \end{array}$$

$$\frac{105}{13} = \frac{13t}{13}$$

$$\frac{105}{13} = t$$

11. A

Simplify

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

$$y = 2x^2 + 2x - x - 1$$

$$y = 2x^2 + x - 1$$

Substitute into
the other equation

$$x = 2y + 3$$

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

simplify

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

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

$$x = 4x^2 + 2x + 1$$

Solve for x

$$\begin{array}{r} x = 4x^2 + 2x + 1 \\ -x \quad \quad -x \\ \hline \end{array}$$

$$0 = 4x^2 + x + 1$$

Use quadratic formula

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

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

$$x = \frac{-1 \pm \sqrt{1 - 16}}{2}$$

$$x = \frac{-1 \pm \sqrt{-15}}{2} \leftarrow \begin{array}{l} \text{imaginary,} \\ \text{so} \\ \text{no real} \\ \text{solutions} \end{array}$$

12. D

Cost of Ria's = x

Cost of Olivia's = x + 2

$$\text{Total} = x + x + 2$$

$$= 2x + 2$$

Total with tip:

10% ↑ so 110%

$$110\% = 1.10$$

$$1.10(2x + 2)$$

$$2.2x + 2$$

They will split it evenly,
so divide by 2

$$\frac{2.2x + 2}{2} \quad \frac{2}{2}$$

$$1.1x + 1$$

13. B

If $f(x)$ and $g(x)$ intersect at $(-k, 7)$ and $(k, 7)$, then the x-value k makes the two functions equal each other.

Set the functions equal to each other and solve for x.

$$\begin{array}{r} x^2 - 2 = 7 \\ -7 \quad -7 \\ \hline \end{array}$$

$$x^2 - 9 = 0$$

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

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

k can be 3 or -3

14. B

Multiply the numerator
& denominator by conjugate
of the denominator

$$\frac{7-i}{3-2i} \cdot \frac{(3+2i)}{(3+2i)} \text{ Distribute}$$

$$\frac{21 + 14i - 3i - 2i^2}{9 + 6i - 6i - 4i^2}$$

combine like terms

$$\frac{21 + 11i - 2i^2}{9 - 4i^2}$$

$$i^2 = -1$$

$$\frac{21 + 11i - 2(-1)}{9 - 4(-1)}$$

$$\frac{21 + 11i + 2}{9 + 4}$$

$$\frac{23 + 11i}{13}$$

Write in $a + bi$ form

$$\frac{23}{13} + \frac{11}{13}i$$

$$a = \frac{23}{13}$$

15. C

$$x^2 - \frac{k}{3}x = 2p$$

Get one side equal to 0,
So we can use the quadratic
formula.

$$x^2 - \frac{k}{3}x - 2p = 0$$

$$a = 1, b = -\frac{k}{3}, c = -2p$$

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

$$\frac{-(-\frac{k}{3}) \pm \sqrt{(-\frac{k}{3})^2 - 4(1)(-2p)}}{2(1)}$$

$$\frac{\frac{K}{3} \pm \sqrt{\frac{K^2}{9} + 8P}}{2}$$

2

None of the answer choices have $\frac{K^2}{9}$, so it seems that $\sqrt{\frac{1}{9}}$ was factored out.

$$\frac{\frac{K}{3} \pm \sqrt{\left(\frac{1}{9}\right)(K^2 + 72P)}}{2}$$



$$\frac{\frac{K}{3} \pm \sqrt{\frac{1}{9} K^2 - 72P}}{2}$$

2

$$\frac{\frac{K}{3} \pm \frac{1}{3} \sqrt{K^2 - 72P}}{2}$$

2

$$\frac{\frac{K}{3} \pm \frac{1}{3} \sqrt{K^2 - 72P}}{2}$$

2

2

$$\frac{K \pm \sqrt{K^2 - 72P}}{6}$$

6

6

16.16

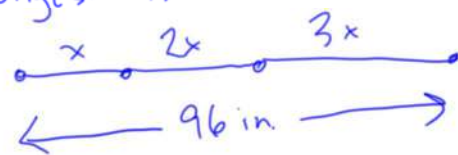
The answer must be in inches,
So convert 8ft to inches.

$$8\text{ft} \times \frac{12\text{in}}{1\text{ft}} = 96\text{inches}$$

Short: x

2nd longest: $2x$

longest: $3x$



$$x + 2x + 3x = 96$$

$$6x = 96$$

$$\frac{6x}{6} = \frac{96}{6}$$

$$x = 16$$

17. 6

$$x^3 - 6x^2 + 6x - 36 = 0$$

Factor by grouping

$$x^3 - 6x^2 + 6x - 36 = 0$$

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

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

Set each factor equal to zero and solve

$$x^2+6=0$$

$$x^2 = -6$$

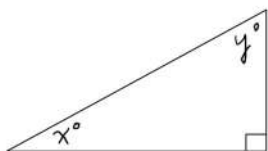
$$x = \sqrt{-6}$$

↑
imaginary

$$x-6=0$$

$$x = \boxed{6}$$

18. 0.4, .4 or $\frac{2}{5}$



Based on the diagram,

$$x + y = 90$$

Therefore, $\sin x = \cos y$.

If $\sin x = 0.4$, then

$$\cos y = 0.4$$

19. 2.5 or $\frac{5}{2}$

We can use elimination to solve for x . Eliminate y .

$$-2x + 5y = 20$$

$$-5(4x + y = 15)$$

$$-2x + 5y = 20$$

$$-20x - 5y = -75$$

$$\hline -22x = -55$$

$$-22x = -55$$

$$\hline -22 \quad -22$$

$$x = 2.5$$

20. 7.5 or $\frac{14}{2}$

10 cans, 3 oz. p

24 cans, 8 oz. p

Find the rate

$$\frac{8\text{oz} - 3\text{oz}}{24\text{ cans} - 10\text{ cans}} = \frac{5\text{oz}}{14\text{ cans}}$$

We need to find how many ounces for every 21 cans

$$\frac{5\text{oz}}{14\text{ cans}} = \frac{n}{21}$$

$$105 = 14n$$

$$\frac{105}{14} = \frac{14n}{14}$$

$$7.5 = n$$

Practice Test 2, Section 4

Explanations

1. C

$$\begin{array}{r} \$13.10 \leftarrow \text{Total} \\ - \quad 9.50 \leftarrow \text{monthly fee} \\ \hline \$3.60 \leftarrow \text{rented movies} \end{array}$$

$$\frac{\$3.60}{\$1.20} = \boxed{3}$$

↑ cost per rented movie

2. A

Increases by 10 $\frac{\text{words}}{\text{month}}$, a constant rate, so this is a linear function

$$y = mx + b$$

↑ slope (rate) ↑ y-int (initial value)
 ↓ ↓

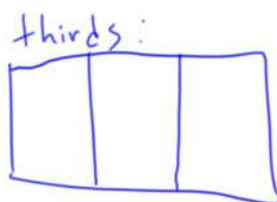
$$y = 10x + 135$$

$$10m + 135$$

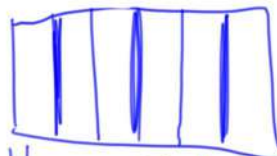
or

$$135 + 10m$$

3. D



then halved:



there will be 6 pieces

$$\frac{6 \text{ pounds}}{6} = 1 \text{ pound each}$$

$$1 \text{ pound} = \boxed{16 \text{ oz}}$$

4. D

35.3% said yes in the survey, so we would expect 35.3% of all the students to say yes.

$$35.3\% = .353$$

$$\begin{array}{r} 225 \\ \times .353 \\ \hline 79.425 \end{array}$$

About 80

5. C

$$\text{density} = \frac{\text{mass}}{\text{Volume}}$$

$$\text{Volume} = ?$$

$$\text{mass} = 60\text{g}$$

$$\text{density} = 5\text{g/mL}$$

$$5 = \frac{60}{x}$$

write 5 as $\frac{5}{1}$, then
cross multiply

$$\frac{5}{1} = \frac{60}{x}$$

$$5x = 60$$

$$\frac{5x}{5} = \frac{60}{5}$$

$$x = 12$$

6. C

x = # of hours Larry studied

$x+13$ = # of hours Nina studied

Their hours add up to 63

$$x + x + 13 = 63$$

$$2x + 13 = 63$$

$$\begin{array}{r} -13 \\ 2x + 13 = 63 \\ \hline 2x = 50 \end{array}$$

$$2x = 50$$

$$\frac{2x}{2} = \frac{50}{2}$$

$$x = 25$$

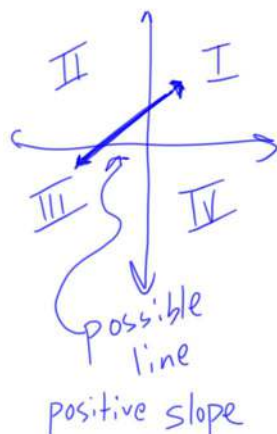
7. B

MPAA Rating	Action	Animated	Comedy	Drama	Total
PG	2	7	2	5	16
PG-13	9	0	5	5	19
R	7	0	2	6	15
Total	18	7	9	16	50

Dramas with an R rating

$$\frac{6}{50} = \frac{3}{25}$$

8. C



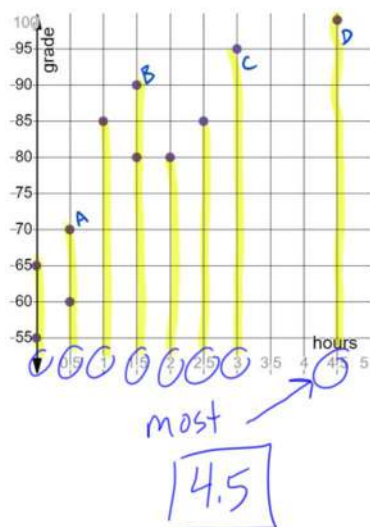
9. D

Region	Age 18 to 24	Age 25 to 44	Age 45 to 64	Age 65 to 74	75 & Older	Total
Northeast	2,713	8,159	10,986	3,342	2,775	27,975
Midwest	3,453	11,237	13,865	4,221	3,350	36,126
South	5,210	18,072	21,346	7,272	4,969	56,869
West	3,390	10,428	11,598	3,785	2,986	32,187
Total	14,766	47,896	57,795	18,620	14,080	153,157

Chosen from 45-64
from 45-64 + south region

$$\frac{21346}{57795} = 0.3693 \approx 0.37$$

10. C



11. A

grade
time

$$A \quad \frac{70}{0.5} = 140$$

$$B \quad \frac{90}{1.5} = 60$$

$$C \quad \frac{95}{3} = 31.67$$

$$D \quad \frac{99}{4.5} = 22$$

greatest: A

12. A

x-intercepts at -4, -2, and 1

x-intercepts are zeros

We can solve for the factors

$$\begin{array}{l|l|l} x = -4 & x = -2 & x = 1 \\ +4 & +2 & -1 \\ \hline x+4=0 & x+2=0 & x-1=0 \end{array}$$

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

13. C

Time (weeks)	Population
0	5
5	25
10	125
15	625
20	3125

Not linear because it does not increase at a constant rate.

The population is multiplied by 5 every 5 years, so it's exponential.

Increasing $\rightarrow$ growth
Exponential growth

14. D

$$\text{at } 10\% \\ 1000 \left(1 + \frac{10}{1200}\right)^{12}$$

$$\text{at } 6\% \\ 1000 \left(1 + \frac{6}{1200}\right)^{12}$$

Difference

$$1000 \left(1 + \frac{10}{1200}\right)^{12} - 1000 \left(1 + \frac{6}{1200}\right)^{12}$$

15. B

Try it in your calculator. According to the question, a is negative and b is positive. Try $y = -2x^3$.

16. A

Store A's cost

$$y = M + (W + K)x$$

$$y = 750 + (15 + 65)x$$

$$y = 750 + 80x$$

Store B's cost

$$y = M + (W + K)x$$

$$y = 600 + (25 + 80)x$$

$$y = 600 + 105x$$

$$\text{Store B} \geq \text{Store A}$$

$$600 + 105x \geq 750 + 80x$$

$$\begin{array}{r} -80x \end{array} \quad \begin{array}{r} -80x \end{array}$$

$$600 + 25x \geq 750$$

$$\begin{array}{r} -600 \end{array} \quad \begin{array}{r} -600 \end{array}$$

$$25x \geq 150$$

$$\frac{25x}{25} \geq \frac{150}{25}$$

$$x \geq 6$$

17. B

$$y = M + (W + K)x$$

rewrite

$$y = (W + K)x + M$$

$$y = m x + b$$

(slope) (y-int)

y-int: M, Materials' cost

18. A

Sara has 231 in³ of milk.

Cylindrical glasses

$$V = \pi r^2 h$$

$$h = 9 \text{ in}$$

$$d = 4, \text{ so } r = 2$$

$$V = \pi (2)^2 (9) = 113.1 \text{ in}^3$$

$$231 \div 113.1 = 2.04$$

2

19. C

$$4p - 5 \geq 3$$

$$\begin{array}{r} +5 \quad +5 \\ 4p \geq 8 \end{array}$$

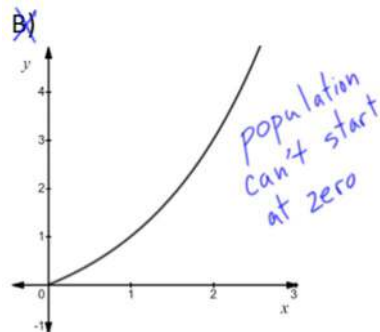
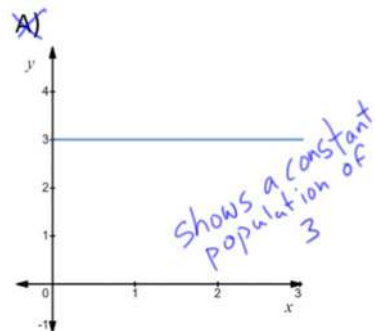
We want the least possible value of $4p + 2$, so use the least possible value of $4p$: 8

$$4p + 2$$

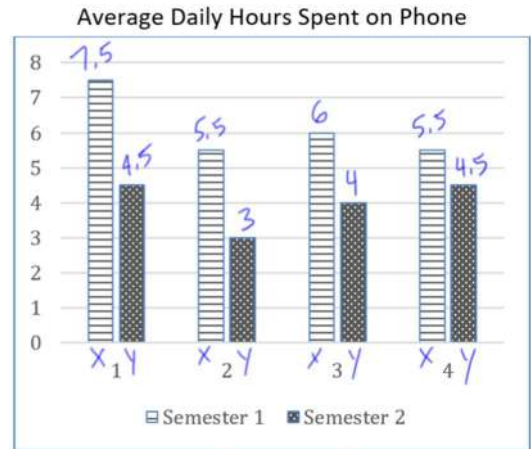
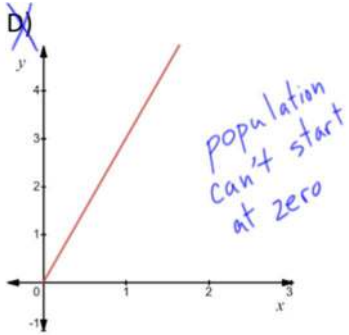
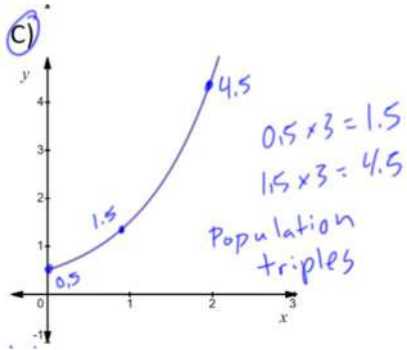
$$8 + 2$$

$$10$$

20. C



21. A

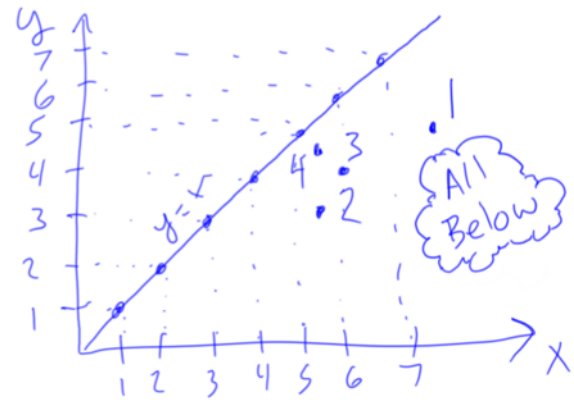


Class 1: (7.5, 4.5)

Class 2: (5.5, 3)

Class 3: (6, 4)

Class 4: (5.5, 4.5)



22. B

Percent Change

$$\frac{\text{Change}}{\text{Original}} \times 100\%$$

Class 1

$$7.5 \rightarrow 4.5$$

$$\frac{3}{7.5} \times 100\% = 40\%$$

Class 2

$$5.5 \rightarrow 3$$

$$\frac{2.5}{5.5} \times 100\% = 45.5\%$$

Class 3

$$6 \rightarrow 4$$

$$\frac{2}{6} \times 100\% = 33.3\%$$

Class 4

$$5.5 \rightarrow 4.5$$

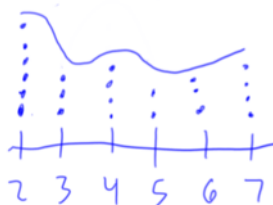
$$\frac{1}{5.5} \times 100\% = 18.2\%$$

23. B

Class A

Number of Presidents	Frequency
2	6
3	3
4	4
5	2
6	3
7	4

Class A has a relatively high standard deviation because none of the values are clustered together.



Class B

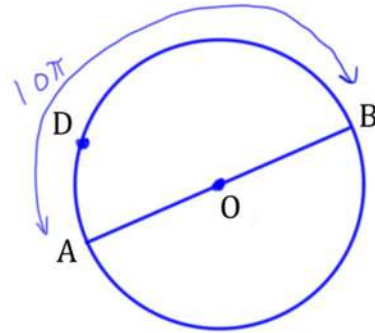
Number of Presidents	Frequency
2	1
3	5
4	10
5	4
6	1
7	1

Class B has a relatively small standard deviation since most of the numbers are 4 (there are ten 4s) and nine numbers are within one of 4 (there are five 3s and four 5s).

A dot plot would look like this:



24. C



Arc ADB is 10π and half of the circumference, so the full circumference is 20π .

$$C = 2\pi r$$

$$20\pi = 2\pi r$$

$$\frac{20\pi}{2\pi} = \frac{2\pi r}{2\pi}$$

$$10 = r$$

25. B

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

$$g(x) = x + 2$$

$$B) f(x) + 8g(x)$$

$$2x^3 + 5x^2 + 8(x + 2)$$

$$2x^3 + 5x^2 + 8x + 16$$

Factor by grouping

$$2x^3 + 5x^2 + 8x + 16$$

$$x^2(2x + 5) + 4(2x + 5)$$

$$(x^2 + 4)(2x + 5)$$

$x^2 + 4$ is a factor

26. C

$$-y < x < y$$

Try Numbers, $y = 5$

$$-5 < x < 5$$

x could be negative, positive or zero, so test all possibilities.

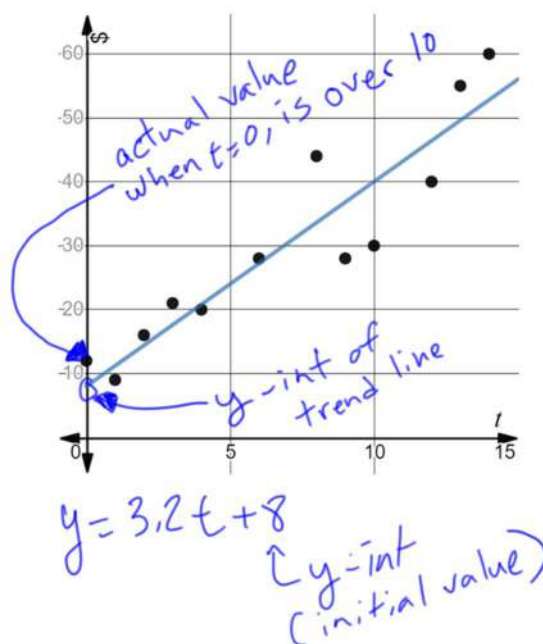
Test $x = -3, 3, 0$

$$\begin{array}{l} \text{I. } | -3 | < 5 \checkmark \\ | 3 | < 5 \checkmark \\ | 0 | < 5 \checkmark \end{array} \left. \vphantom{\begin{array}{l} | -3 | < 5 \\ | 3 | < 5 \\ | 0 | < 5 \end{array}} \right\} \text{True}$$

$$\text{II } -3 = 0 \text{ False}$$

$$\text{III } y > 0 \text{ True}$$

27. D



28. D

The minimum value can be seen when the quadratic function is in vertex-form

$$y = (x - a)^2 + b$$

vertex: (a, b)

Eliminate answer choices not in vertex form

~~A~~ $f(x) = x^2 + 2x + 2$

B) $f(x) = (x - 1)^2 - 5 \rightarrow \text{vertex } (1, -5)$

~~C~~ $f(x) = x(x + 2) + 2$

D) $f(x) = (x + 1)^2 - 9 \rightarrow \text{vertex } (-1, -9)$

Let's find the actual vertex

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

So the zeros are

$$x = -4, 2$$

the vertex is in the middle of them, so at $x = -1$.
Substitute -1 in for x to find the y -value

$$y = (-1+4)(-1-2)$$

$$y = -9$$

$$y = (x+1)^2 - 9$$

29. D

The avg. of m and 8 is x

$$\frac{m+8}{2} = x$$

The avg. of $2m$ and 16 is y

$$\frac{2m+16}{2} = y$$

The avg. of $3m$ and 20 is z .

$$\frac{3m+20}{2} = z$$

Avg of x, y , and z :

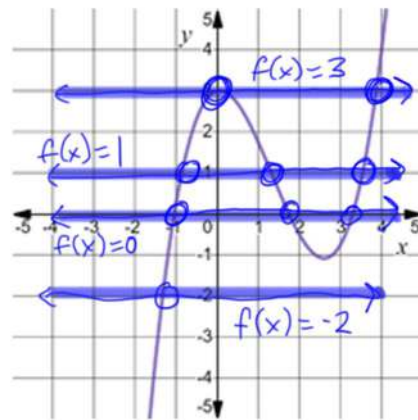
$$\frac{x+y+z}{3}$$

$$\frac{\frac{m+8}{2} + \frac{2m+16}{2} + \frac{3m+20}{2}}{3}$$

$$\frac{\frac{6m+44}{2}}{3} = \frac{3m+22}{3} = \boxed{\frac{m+22}{3}}$$

30. D

$f(x) = k$ will be a horizontal line
Solutions are where the functions intersect



$f(x) = 3 \rightarrow 2$ solutions

$f(x) = 1 \rightarrow 3$ solutions

$f(x) = 0 \rightarrow 3$ solutions

$f(x) = -2 \rightarrow 1$ solution

31. 890

Initial: 530 gallons
Rate: 6 gallons/minute
60 minutes

$$\begin{array}{r} 60 \\ \times 6 \\ \hline 360 \end{array} \text{ gallons added}$$

$$\begin{array}{r} 530 \\ + 360 \\ \hline 890 \end{array} \text{ total gallons}$$

32. $\frac{1}{3}$ or .333

$$P = \frac{x + 420}{3}$$

rewritten as

$$P = \frac{x}{3} + \frac{420}{3}$$

$$P = \frac{1}{3}x + 140$$

↑ rate

$$\boxed{\frac{1}{3} \text{ or } .333}$$

33. 5.58

$$1 \text{ pes} = 11.65 \text{ in}$$

$$1 \text{ pes} = 16 \text{ digits}$$

Therefore,

$$11.65 \text{ in} = 16 \text{ digits}$$

$$92 \text{ digits} \times \frac{11.65 \text{ in}}{16 \text{ digits}} \times \frac{1 \text{ ft}}{12 \text{ in}}$$

$$\frac{1,071.8}{192} = 5.58229$$

$$\boxed{5.58}$$

34. 100

$$\begin{array}{r} 320 \text{ male, } 180 \text{ female} \\ + 100 \\ \hline 280 \text{ female} \end{array}$$

$$\frac{3}{5} = \frac{\text{males}}{\text{total}}$$

$$\text{male} = 320 + x$$

$$\text{total} = \text{female} + \text{male}$$

$$= 280 + 320 + x$$

$$= 600 + x$$

$$\frac{3}{5} = \frac{320+x}{600+x}$$

$$3(600+x) = 5(320+x)$$

$$1800 + 3x = 1600 + 5x$$

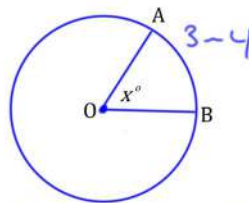
$$\begin{array}{r} -3x \quad -3x \\ 1800 = 1600 + 2x \\ -1600 \quad -1600 \\ 200 = 2x \\ 200 = \frac{2x}{2} \\ 100 = x \end{array}$$

35. 4

$$q = \frac{1}{2}mv^2$$

v becomes $2v$, so v is doubled.
However, in the formula, v is squared, so $2v$ is squared.
 $(2v)^2 = 4v^2$
 The expression becomes multiplied by 4.
4

36. 22, 23, 24, 25, 26, 27, or 28



$$C = 2\pi r = 2\pi 8$$

$$C = 16\pi$$

$$\frac{x}{360} = \frac{L}{C}$$

$$\frac{x}{360} = \frac{3}{16\pi}$$

$$16\pi x = 1080$$

$$x = 21.49$$

$$\frac{x}{360} = \frac{4}{16\pi}$$

$$16\pi x = 1440$$

$$x = 28.65$$

x must be an integer

between 21.49 and 28.65

$$x = 22, 23, 24, 25, 26, 27, 28$$

37. 0.74 or .74

Decrease by 26%, so each week the stock will have 74% of its value

$$74\% = .74$$

$$0.74 \text{ or } .74$$

38. 174

From question 37,
 $r = 0.74$

$$V = 430(0.74)^t$$

$$V = 430(0.74)^3$$

$$V = 174.25$$

$$\boxed{174}$$