Practice Test 1, Section 3 Explanations

1. B

d represents the cost per cup of flour, so if a flour with a different price is used, d will change.

2. C

$5z = 25$

$\frac{5z}{5} = \frac{25}{5}$

$z = 5$

$12z + 7$

$12(5) + 7$

$60 + 7$

$\boxed{67}$

3. C

$b^{\frac{4}{5}}$ ← power, ← root

$\sqrt[5]{b^4}$

4. B

#in US. $= 3 \times$ (#in Eng.)

$315 = 3(x)$

$315 = 3x$

5. B

$\frac{3}{x} = \frac{9}{x+24}$

$3(x+24) = 9x$

$3x + 72 = 9x$

$-3x \quad -3x$

$72 = 6x$

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

$12 = x$

$\frac{x}{3} = \frac{12}{3} = \boxed{4}$

6. A

$x - y = ?$

Try to solve for $x - y$ directly

$-2y - 3x = 12$

$y = -4x - 1$

$y = -4x - 1$

$+4y \quad +4x$

$y + 4x = -1$

Now, we have

$-2y - 3x = 12$

$y + 4x = -1$

Add them together to get $x - y$

$-2y - 3x = 12$

$y + 4x = -1$

$-y + x = 11$ (reorder $x + y$)

$x - y = 11$

7. C

Factors of a function are used to help find the zeros of a function. For example, if the factor of a function was $(x + 5)$, the value of the function would be zero at $x = -5$.

From the table, we can see that the function is zero when $x = 1$, so a factor would be $(x - 1)$.

8.

(c, d) is a point on the line $y = 4x + b$, so c and d can be substituted in for x and y.

(c, d)

$x \quad y$

$d = 4c + b$ (y-int)

$-4c \quad -4c$

$d - 4c = b$

9. A

$3y - kx = 9$

$4y - 6x = 28$

These are linear functions, so they will have no solution when they have the same slope and different y-intercepts. Solve for y in both equations to get them into $y = mx + b$ form, so we can easily identify the slopes.

$3y - kx = 9$

$+kx \quad +kx$

$3y = kx + 9$

$\frac{3y}{3} = \frac{k}{3}x + \frac{9}{3}$

$y = \frac{k}{3}x + 3$ ($\frac{k}{3}$ = slope)

$4y - 6x = 28$

$+6x \quad +6x$

$4y = 6x + 28$

$\frac{4y}{4} = \frac{6x}{4} + \frac{28}{4}$

$y = \frac{3}{2}x + 7$ ($\frac{3}{2}$ = slope)

Set the slopes equal to solve for k

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

$$2k = 9$$

$$\frac{2k}{2} = \frac{9}{2}$$

$$k = \boxed{\frac{9}{2}}$$

10. A

Find where they intersect

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

$$\sqrt{(x+2)^2} = \sqrt{36}$$

$$x+2 = \pm 6$$

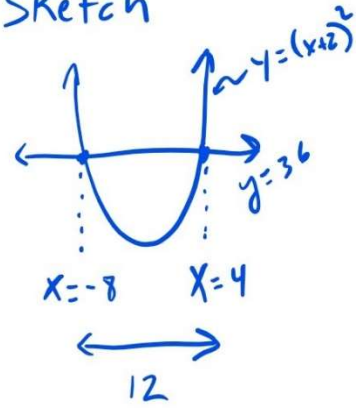
$$-2 \quad -2$$

$$x = -2 \pm 6$$

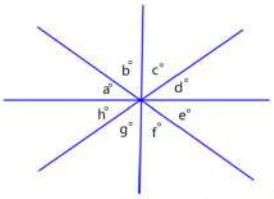
$$x = -2+6, \; x = -2-6$$

$$x = 4, \; x = -8$$

Sketch



11.



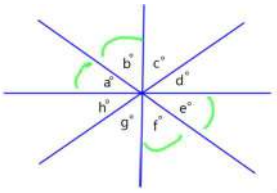
Because of vertical angles,

$a = e$
$b = f$
$c = g$
$d = h$

We are given

$h + f = d + e$

$h = d$ (vertical angles), so $f = e$



$f = b$ and $a = e$

so $f = b = a = e$

I. $f = a$ is true

II. Doesn't have to be true.

III. can't be proven.

12.

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

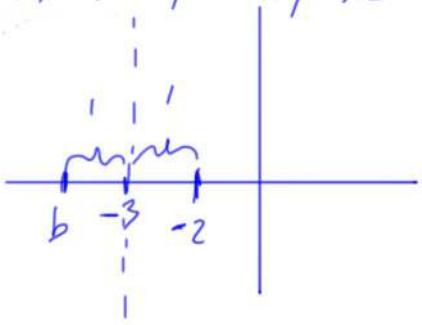
↓

zeros

$x = -2 \quad x = b$

Vertex at $(-3, c)$,

so axis of symmetry: $x = -3$



b must equal -4

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

becomes

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

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

c is the y-value of the vertex.

Substitute the x-value of the vertex in.

$y = a(-3+2)(-3+4)$

$y = a(-1)(1)$

$y = \boxed{-a}$

13.

$$\frac{8x^2+2x+4}{ax+1} = 4x-1+\frac{5}{ax+1}$$

To get this we do long division

$$ax+1 \overline{)\,8x^2+2x+4\,}$$

$$4x-1+\frac{5}{ax+1}$$

Look at the circled terms

$$ax+1 \overline{)\,8x^2+2x+4\,}$$

$$4x-1+\frac{5}{ax+1}$$

$8x^2 \div ax = 4x$, so $a = 2$

$$\frac{-12 \pm \sqrt{(12)^2-4(7)(-3)}}{2(7)}$$

$$\frac{-12 \pm \sqrt{144+84}}{14}$$

$$\frac{-12 \pm \sqrt{228}}{14}$$

$$\frac{-12 \pm \sqrt{4}\sqrt{57}}{14}$$

$$\frac{-12 \pm 2\sqrt{57}}{14}$$

Reduce by 2

$$\frac{-6 \pm \sqrt{57}}{7}$$

14.

Looking at the answer choices, shows us that we will have to use the quadratic formula.

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

$$a = 7, b = 12, and\ c = -3$$

15.

$K = \frac{5}{9}(F - 32) + 273.15$

$K = \frac{5}{9}F + \left(-\frac{160}{9} + 273.15\right)$

$\frac{5}{9}$: slope (rate of change)

combine to equal the y-int

I. True. $\uparrow \frac{5}{9}K$ for every $\uparrow 1F$ and $\downarrow \frac{5}{9}K$ for every $\downarrow 1F$

II. True. If you solve for F, will end up with $\frac{9}{5}$ as the coefficient of $\frac{5}{9}K$.

III. False

16.

$4x(x-8)(x+3) = 0$

Already factored!

set each factor equal to 0 and solve.

$4x = 0$ $\quad x - 8 = 0$ $\quad x + 3 = 0$

$\frac{4x}{4} = \frac{0}{4}$ $\quad +8 \; +8$ $\quad -3 \; -3$

$x = 0$ $\quad x = 8$ $\quad x = -3$

$x > 0$, so x can only be 8.

17.

$\frac{1}{12}x + \frac{1}{18}x = \frac{2}{9} + \frac{1}{18}$

Multiply by the LCD, 36

$(36)\frac{1}{12}x + (36)\frac{1}{18}x = (36)\frac{2}{9} + (36)\frac{1}{18}$

$(\cancel{36}^{3})\frac{1}{\cancel{12}}x + (\cancel{36}^{2})\frac{1}{\cancel{18}}x = (\cancel{36}^{4})\frac{2}{\cancel{9}} + (\cancel{36}^{2})\frac{1}{\cancel{18}}$

$3x + 2x = 8 + 2$

$5x = 10$

$\frac{5x}{5} = \frac{10}{5}$

$x = 2$

18.

$a = 40$

$2b + 3a = 360$

$2b + 3(40) = 360$

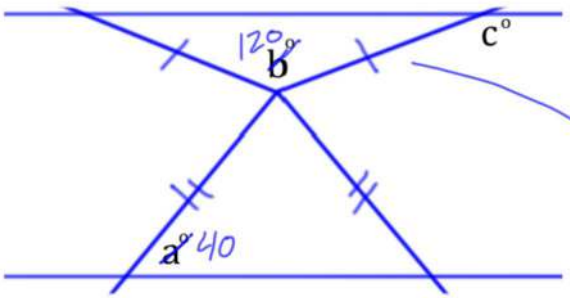
$2b + 120 = 360$

$-120 \quad -120$

$2b = 240$

$\frac{2b}{2} = \frac{240}{2}$

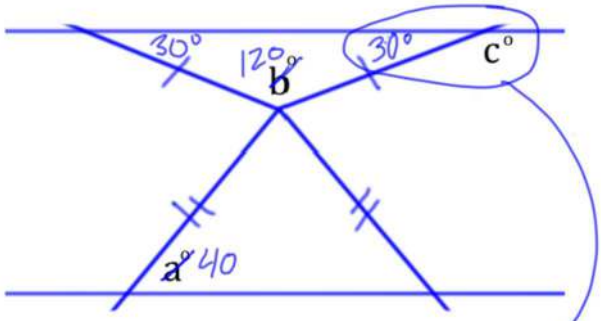
$b = 120$



isosceles △,
so the base angles are equal.

$180 - 120 = 60$

$60 \div 2 = 30$



$30 + c = 180$

$-30 \quad -30$

$c = 150$

19.

L = # of diapers in a large box

S = # of diapers in a small box

$L = S + 30$

$6S + 5L = 612$

$6S + 5(S+30) = 612$

$6S + 5S + 150 = 612$

$11S + 150 = 612$

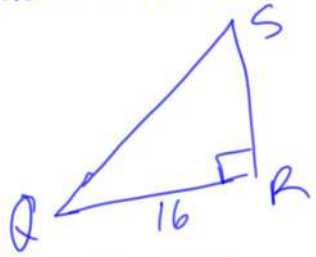
$-150 \quad -150$

$11S = 462$

$S = \boxed{42}$

20.

sketch of △



$\sin Q = 0.28$

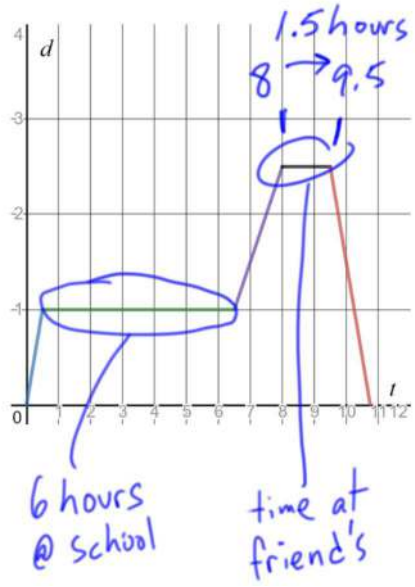
$\cos S = ?$

S & Q are complementary angles, so sine of one of them equals cosine of the other.

$\cos S = \boxed{0.28}$

Practice Test 1, Section 4 Explanations

1. B



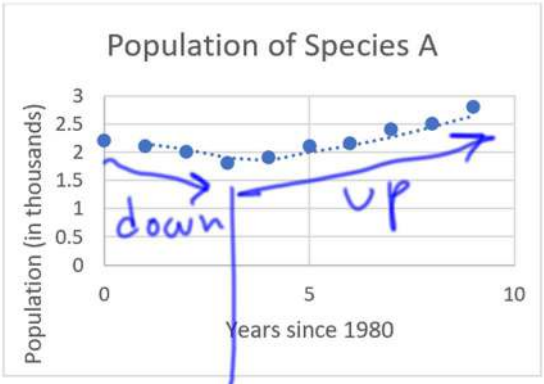
2. B

	Older than 6 years	Younger than 6 years	Total
Cats	5	12	17
Dogs	12	31	43
Total	17	43	60

either a cat older than 6 (5) or a dog younger than 6 (31):
36 options out of 60 total

$\frac{36}{60} = \boxed{\frac{3}{5}}$

3. D



1983

4. C

n	1	4	5	7
$f(n)$	11	23	27	35

The table above shows some values for linear function f. Which of the following defines f?

A) $f(n) = 2n$
B) $f(n) = 3n + 8$
C) $f(n) = 4n + 7$
D) $f(n) = 12n - 1$

$n = 1$
$4(1) + 7 = 11$
$n = 4$
$4(4) + 7 = 23$
$n = 5$
$4(5) + 7 = 27$
$n = 7$
$4(7) + 7 = 35$

5. A

$33\frac{1}{3}\%$ of 21 clerks

$(.333) \times (21) = 7$

25% of 12 cashiers

$(.25) \times (12) = 3$

$7 + 3 = 10$

6. A

Sum → add

$4x^2 - 7x + 9 + 2x^2 + 4x + 6$

$6x^2 - 3x + 15$

7. D

$$\frac{5}{7}w = \frac{3}{4}$$

$$\left(\frac{7}{5}\right)\frac{5}{7}w = \frac{3}{4}\left(\frac{7}{5}\right)$$

$$w = \frac{21}{20}$$

8. C

$y = 0.42x + 16$

slope (rate of change) ↑ y-int (initial value) ↑

used to estimate avg. number per state, so 0.42 is avg increase each year per state

16 is avg initial number in each state

9. B

$$\frac{150 \text{ in.}}{1 \text{ sec}} \times \frac{1 \text{ ft}}{12 \text{ in}} \times \frac{60 \text{ sec.}}{1 \text{ min.}}$$

$$\frac{(150)(60)}{12}\frac{\text{ft}}{\text{min}} = \frac{(150)(\cancel{60}^{5})}{\cancel{12}_{1}}\frac{\text{ft}}{\text{min}}$$

750 ft/min

10. B

	Conversion Factor, k
Euro	0.89
British Pound	0.76
Indian Rupee	71.32
Swiss Franc	0.97
Japanese Yen	108.89

$240 = X Swiss Franc

$\frac{c}{d} = k$

$\frac{X}{240} = 0.97$

$X = (0.97)(240)$

$X = 232.8$

11. B

	Conversion Factor, k
Euro	0.89
British Pound	0.76
Indian Rupee	71.32
Swiss Franc	0.97
Japanese Yen	108.89

$d = 1,356$

$c = 1,030$

$\frac{c}{d} = k$

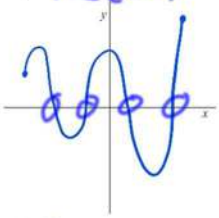
$\frac{1030}{1356} = k$

$0.76 = k$

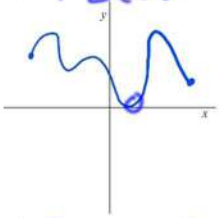
British Pound

12. B

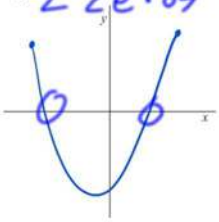
A) 4 zeros



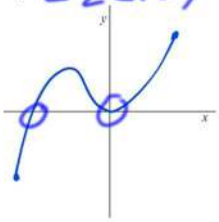
B) 1 zero



C) 2 zeros



D) 2 zeros



13. C

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

$(2)K = \frac{1}{2}mv^2(2)$

$2K = mv^2$

$\frac{2K}{m} = \frac{mv^2}{m}$

$\frac{2K}{m} = v^2$

$\sqrt{\frac{2K}{m}} = v$

14. D

$5/hr

m minutes

Convert m minutes to hours

$m \text{ minutes} \times \frac{1 \text{ hr}}{60 \text{ min.}} = \frac{m}{60} \text{ hr}$

$C = 5\left(\frac{m}{60}\right)$

$C = \frac{5m}{60}$

15. A

Based on the results, more people recovered from the common cold when they were given the treatment than those who didn't get the treatment. We can conclude that the treatment may help people get over the common cold. We cannot choose B because choice B states that the treatment will definitively help patients recover. However, everyone in the study who received the treatment did not recover. For the same reason, we cannot choose choices C and D.

16. B

In order for $f(x) + g(x)$ to equal 0, one must be the negative value of the other. We can see that happens when $x = 0$. $f(0) = 3$ and $g(0) = -3$. The values add up to 0.

17. D

$S(p) = \frac{1}{3}p + 30$

↑ Product supplied ↑ rate of change

The slope, rate of change, is $\frac{1 \text{ product supplied}}{\$3}$.

For every $3 in price change, the number of products supplied will increase by 1.

$30↑ then 10 prod ↑

18. D

$S(P) = D(P)$

$\frac{1}{3}P + 30 = 380 - \frac{1}{2}P$

Get rid of fractions by multiplying by LCD: 6

$(6)\frac{1}{3}P + (6)30 = (6)380 - (6)\frac{1}{2}P$

$2P + 180 = 2{,}280 - 3P$

$+3P \qquad +3P$

$5P + 180 = 2280$

$-180 \quad -180$

$5P = 2100$

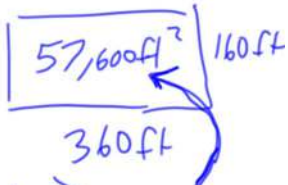
$P = 420$

19. D

$3\text{ ft} = 1\text{ yd}$

$120 \times 3 = 360\text{ ft}$

$53\frac{1}{3} \times 3 = 160\text{ ft}$



$A = l \cdot w = (360)(160) = 57{,}600$

$\frac{1\text{ bag}}{1{,}500\text{ ft}} = \frac{x\text{ bags}}{57{,}600\text{ ft}^2}$

$57{,}600 = 1{,}500x$

$\frac{57{,}600}{1{,}500} = \frac{1{,}500x}{1{,}500}$

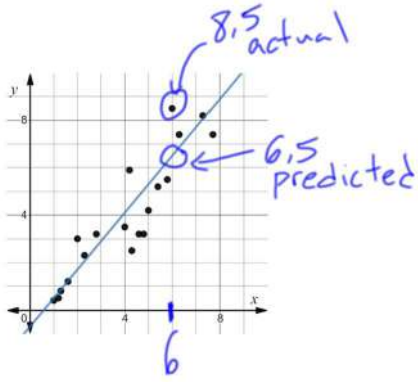
$38.4\text{ bags} = x$

Cover twice

$38.4(2) = 76.8$

77 bags

20. C



$8.5 - 6.5 = 2$

21. C

Since it will increase by 5% of the initial deposit each year, it will increase by the same number each year. Therefore, it is will have linear growth, not exponential.

22. B

Avg of 3 #s is 75

Sum = (Avg)(#)

Sum = (75)(3)

Sum = 225

3 numbers add up to 225

let the #s be $x, y, +z$

Z is 20% less than the sum of x and y means Z is 80% of the sum of x and y

$$Z = 0.8(x+y)$$

$$x+y+z = 225$$

$$x+y+.8(x+y) = 225$$

$$x+y+.8x+.8y = 225$$

$$1.8x+1.8y = 225$$

$$\frac{1.8x}{1.8} + \frac{1.8y}{1.8} = \frac{225}{1.8}$$

$$x+y = 125$$

$$Z = .8(x+y)$$

$$Z = .8(125)$$

$$Z = 100$$

23. C

If a and b are complementary, then $\sin a = \cos b$.

$$\sin a = \cos b$$

$$3k+3 = 5k-7$$

$$-3k \qquad -3k$$

$$3 = 2k-7$$

$$+7 \qquad +7$$

$$10 = 2k$$

$$\frac{10}{2} = \frac{2k}{2}$$

$$5 = k$$

24. B

n = # of cookies

x = # of students

$$2x+8 = n$$

$$3x = n+20$$

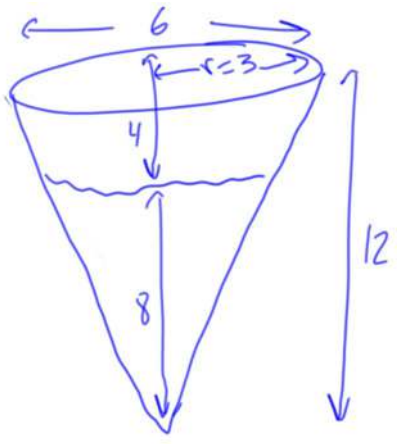
$$3x = 2x+8+20$$

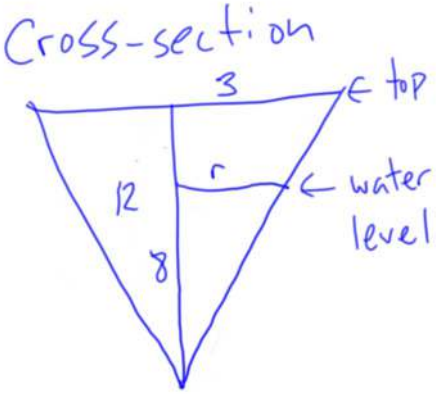
$$3x = 2x+28$$

$$-2x \qquad -2x$$

$$x = 28$$

25. A





We can use a proportion to find the radius at the water-level.

$$\frac{3}{12} = \frac{r}{8}$$

$$24 = 12r$$

$$2 = r$$

Water in cone:

$r = 2$, $h = 8$

$$V = \frac{1}{3}\pi r^2 h$$

$$V = \frac{1}{3}\pi (2)^2 (8)$$

$$V = \frac{32}{3}\pi \text{ ft}^3$$

26. C

If the line passes through the origin, it has the equation $y = mx$. Therefore, $\frac{y}{x} = m$. There is a constant ratio between y and x.

$(2, t)$ $(t, 18)$

$\frac{y}{x} = m$ $\frac{y}{x} = m$

$\frac{t}{2} = m$ $\frac{18}{t} = m$

$\frac{t}{2} = \frac{18}{t}$

$t^2 = 36$

$t = \pm 6$

Or just try the answer choices.

A. 0 $(2, 0)$ $(0, 18)$

$2 \times 0 = 0$ $0 \times 0 \neq 18$ X

B. 4 $(2, 4)$ $(4, 18)$

$2 \times 2 = 4$ $4 \times 2 \neq 18$ X

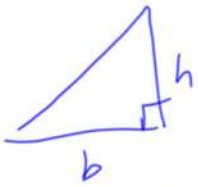
C. 6 $(2, 6)$ $(6, 18)$

$2 \times 3 = 6$ $6 \times 3 = 18$ ✓

D. 9 $(2, 9)$ $(9, 18)$ X

$2 \times 4.5 = 9$ $9 \times 4.5 \neq 18$

27. C



↑ b by 20% = 1.2b

↓ h by 30% = 0.7h

$A = \frac{1}{2}(1.2b)(0.7h)$

$A = (0.84)\frac{1}{2}bh$

0.84 = 84%

a 16% decrease

28. D

↑ 60% means 160%

160% = 1.6

t = hours

increases by 60% every 4 hours

For example, in 8 hours it will increase by 60% twice, so t must be divided by 2

$16{,}000(1.6)^{t/4}$

29. C

male pink = x

male blue = 5x

female blue = y

female pink = 4y

	Pink	Blue
Male	x	5x
Female	4y	y
Total	76	76

$x + 4y = 76$

$5x + y = 76$

use elimination

$-5(x + 4y = 76)$

$5x + y = 76$

$-5x - 20y = -380$

$5x + y = 76$

$-19y = -304$

$\frac{-19y}{-19} = \frac{-304}{-19}$

$y = 16$

$x + 4y = 76$

$x + 4(16) = 76$

$x = 12$

	Pink	Blue
Male	x	5x
Female	4y	y
Total	76	76

$x = 12$

$y = 16$

	Pink	Blue
Male	12	60
Female	64	16
Total	76	76

Total 72

$$\frac{\#\text{ males who like pink}}{\#\text{ males}}$$

$$\frac{12}{72}$$

$\frac{1}{6} = 0.167$

30. A

$5x + 4b = 2x + 3$

$5y + 4c = 2y + 2$

$b - c = \frac{7}{4}$, $x - y = ?$

Based on the given information and objective, it seems like we should subtract the equations.

Let's reorganize first

$5x + 4b = 2x + 3$ $\quad$ $5y + 4c = 2y + 2$

$-2x \quad -2x$ $\quad$ $-2y \quad -2y$

$3x + 4b = 3$ $\quad$ $3y + 4c = 2$

$3x + 4b = 3$

$-(3y + 4c = 2)$

$3x - 3y + 4b - 4c = 1$

$3(x - y) + 4(b - c) = 1$

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

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

$-7 \quad -7$

$3(x - y) = -6$

$\frac{3(x - y)}{3} = \frac{-6}{3}$

$x - y = -2$

31. 5, 6, or 7

cookies: \$2

brownies: \$3

$13 \leq 2n + 3 \leq 17$

$-3 \quad -3 \quad -3$

$10 \leq 2n \leq 14$

$\frac{10}{2} \leq \frac{2n}{2} \leq \frac{14}{2}$

$5 \leq n \leq 7$

5, 6, or 7

32. 48

Add them up to get

Sum = 480

$\text{Avg} = \frac{\text{Sum}}{\#}$

$\text{Avg} = \frac{480}{10}$

Avg = 48

33. 14

$(-5x^2+2x-9)-3(x^2-4x+1)$

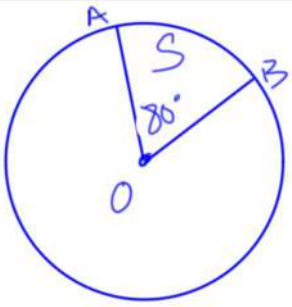
$-5x^2+2x-9-3x^2+12x-3$

$-8x^2+14x-12$

ax^2+bx+c

$b=14$

34. $\frac{2}{9}$ or .222



$\frac{80}{360}=\frac{S}{A}$

$\frac{8}{36}=\frac{S}{A}$

$\boxed{\frac{2}{9}=\frac{S}{A}}$

35. 0

20 contests

Avg = 60

Sum = (Avg)(#)

Sum = (60)(20)

Sum = 1200

The 20 contests must add up to 1,200 for a 60 average

First 10, Avg = 56

Sum = (56)(10) = 560

Remaining 10 must add up to 1200 − 560 = 640

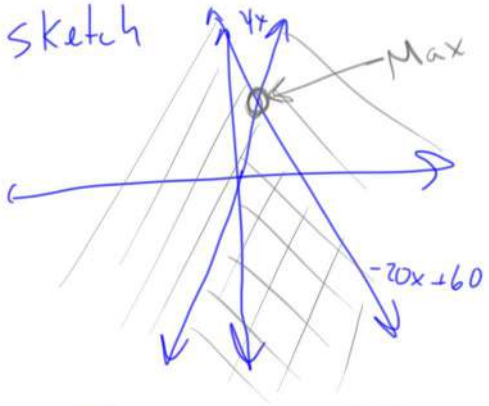
To find the least possible score for the 11th, we have to assume the highest possible for the other 9.

Sum = (80)(9)

Sum = 720

He only needs 640, so he can get a 0 on his 11th and still get a 60 average.

36. 10



$4x = -20x + 60$

$+20x \quad +20x$

$24x = 60$

$\frac{24x}{24} = \frac{60}{24}$

$x = 2.5$

(a, b)

$\uparrow \quad \uparrow$ need this

2.5

$y = 4x$

$y = 4(2.5)$

$y = 10$

$b = \boxed{10}$

37. 319

$d = st$

$45_{min} = 0.75$ hr

$8 - 0.75 = 7.25$ hrs driving

$d = (44)(7.25)$

$d = 319$

38. 5.95 or 5.96

$d = st$

$30_{min} = 0.5$ hr

$8 - 0.5 = 7.5$ hrs driving

$d = (40)(7.5)$

$d = 300$

$\frac{\text{change}}{\text{original}} \times 100\%$

$\frac{319 - 300}{319} \times 100$

5.95% or 5.96%