1. The correct answer is (c).

We substitute in the value of 2 for k in the expression and solve

$3\,(2)^2 - 2\,(2) - 6$

$= 3\,(4) - 4 - 6$

$= 12 - 4 - 6$

$= 8 - 6$

$= 2$

2. The correct answer is (d).

Since $A = \pi r^2$ **and** $r = x + 2$ **then substituting for r into the equation we get**

$A = \pi\,(x + 2)^2$

$= \pi\,(x + 2)\,(x + 2)$

$= \pi\,(x^2 + 2x + 2x + 4)$

$= \pi\,(x^2 + 4x + 4)$

3. The correct answer is (d).

If we want the least possible value of y, then we want to use the largest possible value of x. Since $12 \le x \le 20$ **then the largest possible value for x is 20. To find the value for y, we substitute** $x = 20$ **into the equation.**

$2\,(20) + y = 80$

$40 + y = 80$

To solve for y, we subtract 40 from both sides of the equation.

$$\begin{array}{r} 40 + y = 80 \\ -40 \quad -40 \\ \hline y = 40 \end{array}$$

4. The correct answer is (a).

Changing answer (a) from a combined fraction back into two separate fractions, we get the following:

$$\frac{a - b}{ab} = \frac{a}{ab} - \frac{b}{ab}$$

and reducing the right side we get

$$= \frac{1}{b} - \frac{1}{a}$$

$\frac{1}{b} - \frac{1}{a}$ **is not equivalent to** $\frac{a}{b} - \frac{b}{a}$

5. The correct answer is (c).

We can simplify the equation changing it back into two separate fractions from a combined fraction as follows:

$$\frac{rs + s}{s} = \frac{rs}{s} + \frac{s}{s}$$

$$= r + 1$$

Or it could be simplified in this manner

$$\frac{rs + s}{s} = \frac{s\,(r + 1)}{s}$$

$$= r + 1$$

6. The correct answer is (a).
Since the formula is given to us we simply substitute in the values given into the formula and solve for the missing variable

$$s = \frac{1}{2}\,at^2$$

s = 90, a = 20, and t = ?

$$90 = \frac{1}{2} * 20 * t^2$$

$$90 = \frac{20}{2} * t^2$$

$$90 = 10 * t^2$$

$$\frac{90}{10} = \frac{10}{10} * t^2$$

$$9 = t^2$$

which can be rewritten as

$$t^2 = 9$$

To solve for t, we take the square root of both sides.

$$\sqrt{t^2} = \sqrt{9}$$

$$t = 3 \text{ or } t = -3$$

But since we do not have negative time then can toss out the t = −3 answer so we have t = 3 seconds.

7. The correct aswer is (a).

Following the order of operations we would solve 2^3 = 8 first. Then the absolute value of a negative number is positive, so $|-8| =$ 8. And the last thing we have is a negative sign so the answer −8. So $-(2^3) = -8 = -|-(2^3)|$

8. The correct answer is (c).

The formula for the volume of a rectangle is Volume = length * width * height. We are given the volume, the length and the width so we can solve for the height by substituting the values into the equation.

$2\,x^3 + 2\,x^2 - 8\,x - 8 = (x + 2) * (x - 2) * \text{height}$

$2\,x^3 + 2\,x^2 - 8\,x - 8 = (x^2 - 2\,x + 2\,x - 4) * \text{height}$

$2\,x^3 + 2\,x^2 - 8\,x - 8 = (x^2 - 4) * \text{height}$

From here we can choose each of the answers given and multiply an answer with $(x^2 - 4)$.

Using (a) we have the following :

$(x^2 - 4)\,(2\,x + 10) = 2\,x^3 + 10\,x^2 - 8\,x - 40$

Using (b) we have the following :

$$(x^2 - 4)\,(x^2 + 2) = x^4 + 2\,x^2 - 4\,x^2 - 8$$
$$= x^4 - 2\,x^2 - 8$$

Using (d) we have the following :

$(x^2 - 4)\,(x + 2) = x^3 + 2\,x^2 - 4\,x - 8$

Using (c) we have the following :

$(x^2 - 4)\,(2\,x + 2) = 2\,x^3 + 2\,x^2 - 8\,x - 8$
and this matches the volume given of $2\,x^3 + 2\,x^2 - 8\,x - 8$

9. The correct answer is (a).

If the length = L, then the width (w) is w = L - 10.

Area of a rectangle = length * width
and Area was given as 390. So substituting we get the following :

$390 = L * (L - 10)$

$390 = L^2 - 10\,L$

10. The correct answer is (b).

$4\,x^2 - 16\,y^2$ can be factored as $4\,(x^2 - 4\,y^2)$.

$x^2 - 4\,y^2$ can be rewritten as $x^2 - (2\,y)^2$.

$x^2 - (2\,y)^2$ can be factored as $(x + 2\,y)\,(x - 2\,y)$.

So $4\,x^2 - 16\,y^2 = 4\,(x - 2\,y)\,(x + 2\,y)$.

Looking at the choices given, the correct answer is $4\,(x - 2\,y) = 4\,x - 8\,y$.

11. The correct answer is (d).

We use the formula d = rt and we plug in values for r and t and solve for d.

$$d = \left(\frac{2p}{n}\right)\left(\frac{n+1}{p}\right)$$

$$d = \frac{2(n+1)}{n}$$

$$d = \frac{2n+2}{n}$$

$$d = \frac{2n}{n} + \frac{2}{n}$$

$$d = 2 + \frac{2}{n}$$

12. The correct answer is (b).

The formula for the perimeter of a triangle is the sum of all its sides.

$$\text{Perimeter} = \text{Side 1} + \text{Side 2} + \text{Side 3}$$

Now substituting in the lengths of the sides we get the following :

$$\text{Perimeter} = (6x+2) + (3x+4) + (2x+10)$$

$$\text{Perimeter} = 6x + 3x + 2x + 2 + 4 + 10$$

$$\text{Perimeter} = 11x + 16$$

13. The correct answer is (a).

This problem is dividing one fraction by another fraction.

$$\frac{\frac{v}{2d}}{\frac{2d}{2v}} = \frac{v}{2d} \div \frac{2d}{2v}$$

When dividing by a fraction,
replace the division symbol with a multiplication symbol and flip the fraction that was after the division symbol so that the bottom is now the top and vice versa.

$$\frac{\frac{v}{2d}}{\frac{2d}{2v}} = \frac{v}{2d} * \frac{2v}{2d}$$

$$= \frac{v\,(2\,v)}{(2\,d)\,(2\,d)}$$

$$= \frac{2\,v^2}{4\,d^2}$$

$$= \frac{1\,v^2}{2\,d^2}$$

$$= \frac{v^2}{2\,d^2}$$

14. The correct answer is (b).

$|x+4| = 10$ which means $x+4 = 10$ or $x+4 = -10$

Case 1 :

Solving for x in this case we get the following :

$$\begin{array}{r} x+4 = 10 \\ -4 \quad -4 \\ \hline x = 6 \end{array}$$

Case 2 :

Solving for x in this case we get the following :

$$\begin{array}{r} x+4 = -10 \\ -4 = -4 \\ \hline x = -14 \end{array}$$

The question asked about when $x < 0$, so the correct x – value is $x = -14$.

15. The correct answer is (a).

The first thing we want to do is reduce the fraction by dividing the like terms.

$\frac{36}{4} = 9$, $\frac{x^{25}}{x^9} = x^{16}$, $\frac{y^6}{y^2} = y^4$

Now we have $\sqrt{9\,x^{16}\,y^4}$.

Now to simplify this we try to find the factors of the term that are the same then simplify

$$\sqrt{9\,x^{16}\,y^4} = \sqrt{(3*3)\,(x^8*x^8)\,(y^2*y^2)} \quad \left(\sqrt{3*3} = 3,\ \sqrt{x^8*x^8} = x^8,\ \sqrt{y^2*y^2} = y^2\right)$$

$$= 3\,x^8\,y^2$$

16. The correct answer is (b).

First we need to simplify $1 + \frac{2}{x}$

The Least (Lowest) Common Denominator is x and we get the following :

$$1 + \frac{2}{x} = \left(\frac{x}{x}\right) * (1) + \frac{2}{x}$$

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

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

Our problem is now as follows :

$$\frac{10}{1 + \frac{2}{x}} = \frac{10}{\left(\frac{x+2}{x}\right)}$$

$$= 10 \div \left(\frac{x+2}{x}\right)$$

Since we are dividing by a fraction we can flip the fraction and mulitply

$$= 10 * \left(\frac{x}{x+2}\right)$$

$$= \frac{10}{1} * \left(\frac{x}{x+2}\right)$$

$$= \frac{10 * x}{1 * (x+2)}$$

$$= \frac{10\,x}{x+2}$$

17. The correct answer is (d).

If we factor out k in the numerator we get

$$\frac{k\,(16\,k^2 + 8\,k - 1)}{2\,k}$$ **[which is (a)]**

If we cancel out the single k in the numerator with k in the denominator we get

$$\frac{16\,k^2 + 8\,k - 1}{2}$$ **[which is (c)]**

If we separate out the fractions we get

$$8\,k^2 + 4\,k - \frac{1}{2}$$ **[which is (b)]**

The only answer that is not equivalent to $\frac{16\,k^3 + 8\,k^2 - k}{2\,k}$ **is** $16\,k^3 + k^2$**.**

18. The correct answer is (c).

The problem gives us the radius and its height as r = p and h = 2 p. Substituting those into the Volume formula we get the following :

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

$$V = \frac{1}{3}\,\pi\,(p^2 * 2\,p)$$

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

$$V = \left(\frac{1}{3} * 2\right)\pi\,(p^3)$$

$$V = \frac{2}{3}\,\pi\,p^3$$

19. The correct answer is (b).

So solving for S, add Z to both sides

$$\begin{array}{r} RZ = S - Z \\ +Z \quad\quad +Z \\ \hline RZ + Z = S \end{array}$$

Factor out Z

$$Z\,(R + 1) = S$$

Divide both sides by R + 1

$$\frac{Z\,(R+1)}{R+1} = \frac{S}{R+1}$$

$$Z = \frac{S}{R+1}$$

20. The correct answer is (b).

Let p be the price of the shoes.

$$\text{The sale price} = p - (.20)\,p$$
$$= .80\,p$$

$$\text{The final price} = .80\,p - (.10)\,(.80\,p)$$
$$= .80\,p - .08\,p$$
$$= .72\,p$$

21. The correct answer is (a).

To simplify we just multiply the numbers together with the numbers and the same variables with the same variable s and get

$$(=3\,a^2\,b^4)\,(4\,a^2\,b) = (-3*4)\,(a^2*a^2)\,(b^4*b)$$
$$= (-12)\,(a^{2+2})\,(b^{4+1})$$
$$= (-12)\,(a^4)\,(b^5)$$
$$= -12\,a^4\,b^5$$

22. The correct answer is (d).

When dividing fractions we change the sign to multiplication and flip the the second fraction.

$$\frac{4\,b^2+16\,b}{b^2} \div \frac{60}{b^2+4\,b} = \frac{4\,b^2+16\,b}{b^2} * \frac{b^2+4\,b}{60}$$

$$= \frac{4\,b\,(b+4)}{b^2} * \frac{b\,(b+4)}{60}$$

$$= \frac{4\,(b+4)}{b} * \frac{b\,(b+4)}{60}$$

$$= \frac{4\,(b+4)\,(b+4)}{60}$$

$$= \frac{1\,(b+4)^2}{15}$$

Since the question only asks for the denominator, the answer is 15.

23. The correct answer is (b).

We know from the information given the following :

Suzy makes $\frac{a}{b}$

Ron makes $\frac{a-b}{b}$

Sam makes $\frac{4}{3}\left(\frac{a}{b}\right)$ **[Sam makes** $\frac{4}{3}$ **as much as Suzy]**

We add these amounts together to get

$$\frac{a}{b} + \frac{a-b}{b} + \left(\frac{4}{3} * \frac{a}{b}\right) = \frac{a}{b} + \frac{a-b}{b} + \frac{4\,a}{3\,b}$$

The Least Common Denominator for these fractions is 3 b.

Now we can solve the equation using the LCD for the fractions

$$\frac{a}{b} + \frac{a-b}{b} + \frac{4a}{3b} = \left(\frac{3}{3}\right)\left(\frac{a}{b}\right) + \left(\frac{3}{3}\right)\left(\frac{a-b}{b}\right) + \frac{4a}{3b}$$

$$= \frac{3a}{3b} + \frac{3a-3b}{3b} + \frac{4a}{3b}$$

$$= \frac{3a+3a-3b+4a}{3b}$$

$$= \frac{10a-3b}{3b}$$

$$= \frac{10a}{3b} - \frac{3b}{3b}$$

$$= \frac{10a}{3b} - 1$$

24. The correct answer is (d)

Following the order of operations we simplify each parenthesis

$15x - x = 14x$

$2y - 19y = -17y$

Adding the two terms together we get the following :

$$14x + (-17y) = 14x - 17y$$

25. The correct answer is (c).

We find the Least Common Denominator for $\frac{5}{b} - \frac{5}{a}$ (the Numerator) which is ab.

$$\left(\frac{a}{a}\right)\left(\frac{5}{b}\right) - \left(\frac{b}{b}\right)\left(\frac{5}{a}\right) = \frac{5a}{ab} - \frac{5b}{ab}$$

Now find the Least Common Denominator for $\frac{1}{b^2} - \frac{1}{a^2}$ (the Denominator) which is $a^2 b^2$.

$$\left(\frac{a^2}{a^2}\right)\left(\frac{1}{b^2}\right) - \left(\frac{b^2}{b^2}\right)\left(\frac{1}{a^2}\right) = \frac{a^2}{a^2 b^2} - \frac{b^2}{a^2 b^2}$$

Now the problem can be rewritten as follows :

$$\frac{\frac{5a}{ab} - \frac{5b}{ab}}{\frac{a^2}{a^2 b^2} - \frac{b^2}{a^2 b^2}} = \frac{\frac{5a-5b}{ab}}{\frac{a^2-b^2}{a^2 b^2}}$$

We can rewrite the equation and since we are dividing by a fraction we will change the sign to multiplication and flip the fraction :

$$\frac{5a-5b}{ab} \div \frac{a^2-b^2}{a^2 b^2} = \frac{5a-5b}{ab} * \frac{a^2 b^2}{a^2-b^2}$$

Now factoring both fractions we get the following :

$$\frac{5\,(a-b)}{ab} * \frac{a*a*b*b}{(a-b)\,(a+b)}$$ [Note that $a^2 - b^2$ factors out as $(a-b)\,(a+b)$]

$$\frac{5\,(a-b)}{ab} * \frac{a*a*b*b}{(a-b)\,(a+b)} = \frac{5\,(a-b)\,a*a*b*b}{(ab)\,(a-b)\,(a+b)}$$

Which reduces to $\frac{5\,ab}{a+b}$

26. The correct answer is (a).

We factor out 10 which is the greatest common factor and get :

$$60x - 10 = 10\,(6x - 1)$$

27. The correct answer is (a).

We add p to both sides of the equation and get the following :

$$\frac{\frac{9}{x} - p = \frac{5}{n}}{\frac{9}{x} = \frac{5}{n} + p} \quad \begin{matrix} \\ +p \;\; +p \\ \\ \end{matrix}$$

Now we get the right side of the equation into a common denominator

$$\frac{9}{x} = \frac{5}{n} + \left(\frac{n}{n}\right)\left(\frac{p}{1}\right)$$

$$\frac{9}{x} = \frac{5}{n} + \frac{np}{n}$$

$$\frac{9}{x} = \frac{5+np}{n}$$

Now multiply both sides by n, we get

$$\left(\frac{9}{x}\right) * n = \left(\frac{5+np}{n}\right) * n$$

$$\left(\frac{9}{x}\right) * n = 5 + np$$

Now multiply both sides by x, we get

$$x * \left(\frac{9}{x}\right) * n = (5+np) * x$$

$$9 * n = (5+np) * x$$

Now divide both sides by 5 + np, we get

$$\frac{9\,n}{5+np} = \frac{(5+np)\,x}{(5+np)}$$

$$\frac{9\,n}{5+np} = x$$

28. The correct answer is (d).

$$-2\,(3\,x+1) = -10\,x+6$$

Multiplying out the left side of the equation gets us

$$-6\,x-2 = -10\,x+6$$

Now add 10 x to both sides

$$\begin{array}{r} -6\,x-2 = -10\,x+6 \\ +10\,x \;\; = +10\,x \\ \hline 4\,x-2 = 6 \end{array}$$

Now add 2 to both sides

$$\begin{array}{r} 4\,x-2 = 6 \\ +2 \;\; +2 \\ \hline 4\,x \;\; = 8 \end{array}$$

Finally divide both sides by 4 so we can find find out what a single x will equal

$$\frac{4\,x}{4} = \frac{8}{4}$$

$$x = 2$$