1) Solve this equation. One of the solutions is: $x(3x-5)=2$

A $x=-2$

B $x=1$

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

D $x=\frac{2}{3}$

E $x=4$

$x(3x-5)=2$

$3x^2-5x-2=0$

$(3x+1)(x-2)=0$

$3x+1=0 \quad x-2=0$

$x=-\frac{1}{3} \qquad x=2$

2) Solve: $6-\frac{3}{x}=\frac{5}{x^2}$

A $x=\frac{1\pm\sqrt{129}}{4}$

B $x=\frac{3\pm\sqrt{126}}{12}$

C $x=\frac{3\pm\sqrt{129}}{6}$

D $x=\frac{-3\pm\sqrt{129}}{12}$

E $x=\frac{3\pm\sqrt{129}}{12}$

Multiply each term by x^2 to clear denominators.

$x^2(6)-x^2\left(\frac{3}{x}\right)=x^2\left(\frac{5}{x^2}\right)$

$6x^2-3x=5$

$6x^2-3x-5=0$

$x=\frac{3\pm\sqrt{9-4(6)(-5)}}{2(6)}=\frac{3\pm\sqrt{9+120}}{12}$

$x=\frac{3\pm\sqrt{129}}{12}$

3) Richard and Roger together can mow their Uncle's yard in 25 minutes. If Richard mows alone it takes him 10 minutes longer than Roger's time to mow the yard alone. If x equals the time for Roger to mow the yard, which **simplified equation** could be used to find x?

A $x^2+8x-10=0$

B $2x+10=25$

C $x^2+60x-250=0$

D $x^2+10x+250=0$

E $x^2-40x-250=0$

$x=$ time for Roger $\quad x+10=$ time for Richard

Rate for Roger + Rate for Richard = Rate together

$\frac{1}{x}+\frac{1}{x+10}=\frac{1}{25} \qquad LCD=25x(x+10)$

$25x(x+10)\left[\frac{1}{x}+\frac{1}{x+10}\right]=25x(x+10)\left(\frac{1}{25}\right)$

$25(x+10)+25x=x(x+10)$

$25x+250+25x=x^2+10x$

$50x+250=x^2+10x$

$0=x^2-40x-250$

4) Multiply and write as a complex number $(a+bi\ form)$.

$$(-3+7i)^2$$

A $9+49i$

B $58-42i$

C -40

D $58-21i$

E $-40-42i$

$(-3+7i)(-3+7i)$
$=9-21i-21i+49i^2$
$=9-42i+49(-1)$
$=9-42i-49$
$=-40-42i$

5) Solve $|2x-3|=9$. Which statement describes the solution(s)?

A There is one solution and it is positive.
B There is one solution and it is negative.
C There are two solutions, both positive.
D There are two solutions, both negative.
E There are two solutions, one positive and one negative.

$|2x-3|=9$
$2x-3=-9$ *or* $2x-3=9$
$2x=-6$ *or* $2x=12$
$x=-3$ *or* $x=6$
negative *positive*

6) Solve: $\sqrt{4-x}=3$ Which statement describes the solution?

A The solution is less than -8.
B The solution is at least -8, but less than -4.
C The solution is at least -4, but less than 0.
D The solution is at least 0, but less than 5.
E The solution is 5 or greater.

$\sqrt{4-x}=3$
$\left(\sqrt{4-x}\right)^2=3^2$
$4-x=9$
$-x=5$
$x=-5$
between -8 and -4

7) Solve this inequality and write the solution using interval notation.

$$4(x-2)-3(5-2x)>18x+2(5x-1)-21$$

A $(-\infty,0)$

B $(-\infty,0]$

C $(0,\infty)$

D No solution

E None of the above

$4(x-2)-3(5-2x)>18x+2(5x-1)-21$
$4x-8-15+6x>18x+10x-2-21$
$10x-23>28x-23$
$-18x-23>-23$
$-18x>0$
$x<0$ (divided by a negative, switch)
$(-\infty,0)$

8) Which inequality or inequalities is(are) paired with the correct solution?

I	$\frac{1}{4}x-1<2$	$x<12$
II	$\lvert x+3\rvert \geq 2$	$x\leq -5 \text{ or } x\geq -1$
III	$\lvert x+5\rvert <1$	$x<-4$

A I, II, and III

B II and III only

C I and II only

D I only

E I and III only

I $\frac{1}{4}x-1<2$

$4\left(\frac{1}{4}x-1\right)<4(2)$

$x-4<8$

$x<12$ True

III $\lvert x+5\rvert <1$

$-1<x+5<1$

$-6<x<-4$ False

I and II are correct

II $\lvert x+3\rvert \geq 2$

$x+3\leq -2$ *or* $x+3\geq 2$

$x\leq -5$ *or* $x\geq -1$ True

9) Which statement(s) below is(are) false?

I The midpoint of (6, 4) and (10, 2) is (8, 3).

II The distance between the origin and (-8,-15) is 17.

III The slope of any line perpendicular to $y=\frac{2}{3}x-3$ is $-\frac{3}{2}$.

A I only

B II only

C III only

D I and II only

E None are false.

I $M\left(\frac{6+10}{2},\frac{4+2}{2}\right)\rightarrow M\left(\frac{16}{2},\frac{6}{2}\right)\rightarrow M(8,3)$ *true*

II $d=\sqrt{(-8-0)^2+(-15-0)^2}=\sqrt{64+225}$

$=\sqrt{289}$ $(17)(17)=289$ *true*

III Slope of a perpendicular line to one with slope $\frac{2}{3}$ is $-\frac{3}{2}$, the opposite reciprocal. *true*

All 3 statements are true, none are false.

10) Find the general form of the equation for a line through $P(-2,3)$ and with a slope of $\frac{3}{4}$.

A $3x-4y=-18$
B $3x+4y=-18$
C $3x-4y=-6$
D $3x-4y=18$
E $3x-4y=-12$

$y-y_1=m(x-x_1)$
$y-3=\frac{3}{4}(x-(-2))$
$4(y-3)=3(x+2)$
$4y-12=3x+6$
$-3x+4y=18$
$3x-4y=-18$

11) Find the slope and y-intercept of the line with equation $\frac{3}{5}x+2y=-1$.

A $m=\frac{3}{5},\ (0,-1)$
B $m=\frac{3}{10},\ (0,-5)$
C $m=-\frac{3}{10},\ \left(0,-\frac{1}{2}\right)$
D $m=-\frac{3}{10},\ \left(0,-\frac{1}{10}\right)$
E $m=-\frac{3}{5},\ \left(0,-\frac{1}{2}\right)$

$5\left(\frac{3}{5}x+2y\right)=5(-1)$
$3x+10y=-5$
$10y=-3x-5$
$y=-\frac{3}{10}x-\frac{5}{10}$ $\quad m=-\frac{3}{10},\ \left(0,-\frac{1}{2}\right)$

12) Which statement is **false** concerning the graph of $y=x^2-16$?

A Its x-intercepts are $(4,0)$ and $(-4,0)$.
B It has symmetry about the y-axis.
C It does not have a y-intercept.
D It graph is a curve called a parabola.
E It contains the point $(-2,-12)$.

$0=x^2-16$
$0=(x+4)(x-4)$
$x+4=0 \quad x-4=0$
$x=-4 \qquad x=4$ $\quad x$-intercepts: $(-4,0)\ \&\ (4,0)$

$y=(-x)^2-16$
$y=x^2-16$ same equation means symmetry about the y-axis.

$y=0^2-16=-16$
$(0,-16)$ is y-intercept

It is a parabola because of the x^2.

$y=(-2)^2-16$
$y=4-16=-12$
$(-2,-12)$ is a point.

13) The volume of a gas varies directly with the temperature and inversely with the pressure. When the temperature of a certain gas is 300°, the pressure is 50 pounds per square inch and the volume is 12 cubic feet. Find the volume when the temperature is 250° and the pressure is 40 pounds per square inch. Which statement describes this volume?

A The volume is less than 10 cubic feet.
B The volume is at least 10, but less than 11 cubic feet.
C The volume is at least 11, but less than 12 cubic feet.
D The volume is at least 12, but less than 13 cubic feet.
E The volume is 13 or more cubic feet.

$a)\ V = \frac{kT}{P}$ $\quad c)\ V = \frac{2T}{P}$

$b)\ 12 = \frac{k(300)}{50}$ $\quad d)\ V = \frac{2(250)}{40}$

$600 = 300k$ $\quad V = \frac{500}{40}$

$2 = k$ $\quad V = 12.5$

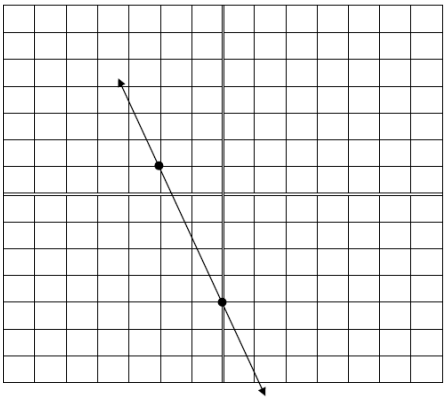
14) Simplify, where i is the imaginary unit. i^{204}

A 1
B -1
C i
D $-i$
E 0

$4\overline{)204}$ $\frac{51}{}$ with no remainder

$i^{204} = i^0 = 1$

15) Which equation matches the graph of the line below?



You can count rise over run and see the slope is $-\frac{5}{2}$ or $m = \frac{-4-1}{0-(-2)} = \frac{-5}{2}$ using the slope formula and the 2 given points.

The y-intercept is -4, so b = -4 (Or either point could be used in point-slope form.)

$y = -\frac{5}{2}x - 4$

A $y = \frac{5}{2}x - 4$

B $y = -\frac{2}{5}x - 4$

C $y = \frac{2}{5}x - 4$

D $y = -\frac{5}{2}x - 4$

E None of the Above.