1) Which choice is the answer to this problem?
(7 points)

$(3+2i)(2-4i)-(6-3i)$ Perform multiplication first.

$=(6-12i+4i-8i^2)-(6-3i)$
$=(6-8i-8(-1))-(6-3i)$
$=(14-8i)-(6-3i)$
$=14-8i-6+3i$
$=8-5i$
Choice *B*

A. $8+11i$
B. $8-5i$
C. $8-11i$
D. $-10-5i$
E. $-8-5i$

2) Find all real solutions to the following equation. If there is more than one solution, separate answers with commas.
(7 points)

$3|3x-2|-15=33$ First, add 15 to both sides.

$3|3x-2|=48$ Next, divide both sides by 3.

$|3x-2|=16$

The expression 'inside' the bars could be -16 or 16.

$3x-2=-16$ or $3x-2=16$
$3x=-14$ $3x=18$
$x=-\frac{14}{3}$ or $x=6$
$x=-\frac{14}{3}, 6$

3) Solve the equation below. Which statement choice is true?
(6 points)

$\sqrt{42-2x} = x+3$ Raise both sides to the 2nd power.
However, remember to check all possible solutions.

$(\sqrt{42-2x})^2 = (x+3)^2$

$42-2x = x^2+6x+9$

$0 = x^2+8x-33$ Equation could be solved by factoring, completing the square, or by the quadratic formula.

$0 = (x+11)(x-3)$

$x+11=0$ $x-3=0$

$x=-11$ $x=3$

checks

$\sqrt{42-2(-11)} \stackrel{?}{=} -11+3$ $\sqrt{42-2(3)} \stackrel{?}{=} 3+3$

$\sqrt{42+22} \stackrel{?}{=} -8$ $\sqrt{42-6} \stackrel{?}{=} 6$

$\sqrt{64} = 8,$ not -8 $\sqrt{36} = 6$

does not check checks

solution: $x = 3$ only

Choice *D* (one solution and it is positive)

A. There are two solutions, both positive.

B. There are two solutions, one positive and one negative.

C. There are two solutions, both negative.

D. There is one solution and it is positive.

E. There is one solution and it is negative.

4) Solve this inequality. Write the solution using interval notation.
(7 points)

$|2x-1|+3<6$ First, subtract 3 from both sides.

$|2x-1|<3$ The quantity inside the bars is within 3 units of 0.

$-3<2x-1<3$

$-2<2x<4$

$-1<x<2$

$(-1,2)$

5) Is the point $(3,-4)$ on the perpendicular bisector of the segment AB where $A(5,0)$ and $B(7,-2)$. Show me proof (organized steps) that it is or it is not.

(7 points)

$d(P,A) ? = d(P,B)$

$\sqrt{(5-3)^2+(0-(-4))^2} ? = \sqrt{(7-3)^2+(-2-(-4))^2}$

$\sqrt{2^2+4^2} \quad ? = \quad \sqrt{4^2+2^2}$

$\sqrt{20} \quad = \quad \sqrt{20}$

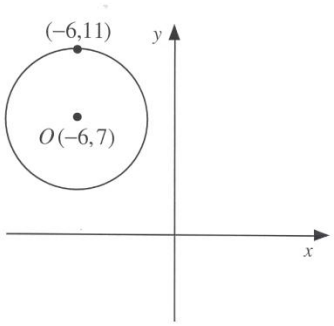
Yes, the point $(3,-4)$ is on the perpendicular bisector of segment AB.

Circle correct answer.

Yes **No**

6) The equation of the circle below is which choice? The center of the circle and a point on the circle are labeled.

(6 points)



You can 'count' the distance between the two points to find the length of the radius. $r = 4$ units

$(x-h)^2+(y-k)^2=r^2$

$(x-(-6))^2+(y-7)^2=4^2$

$(x+6)^2+(y-7)^2=16$

Choice D

A. $(x-6)^2+(y+7)^2=49$

B. $(x+6)^2+(y-7)^2=49$

C. $(x-6)^2+(y+7)^2=16$

D. $(x+6)^2+(y-7)^2=16$

E. $(x-6)^2+(y+7)^2=4$

7) Use the 'completing the square' process to write the equation of the following circle in standard form $(x-h)^2+(y-k)^2=r^2$.

(6 points)

$x^2+y^2-10x+8y+16=0$

$(x^2-10x)+(y^2+8y)=-16$ Complete the square inside each grouping.

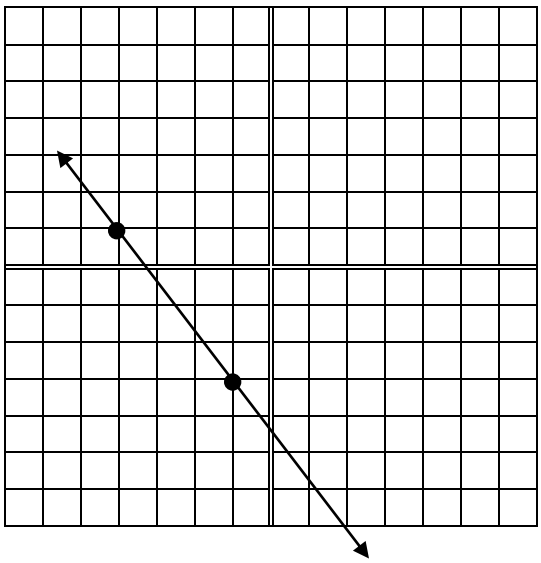
Balance equation.

$(x^2-10x+\left(\frac{10}{2}\right)^2)+(y^2+8y+\left(\frac{8}{2}\right)^2)=-16+\left(\frac{10}{2}\right)^2+\left(\frac{8}{2}\right)^2$

$(x^2-10x+25)+(y^2+8y+16) \quad = \quad -16+25+16$

$(x-5)^2 \quad + \quad (y+4)^2=25$

8) Which equation represents a line shown below? Assume each hash mark is one unit. (7 points)



A. $4x-3y=-13$
B. $3x-4y=-13$
C. $4x+3y=-13$
D. $3x+4y=-13$
E. None of the above.

$m=\frac{-4}{3}$ (Count, down 4, then right 3)

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

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

$3(y+3)=3\left[-\frac{4}{3}(x+1)\right]$

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

$3y+9=-4x-4$

$4x+3y=-13$

Choice C

9) Write the domain for the function below. Use interval notation. (7 points)

$f(x)=\sqrt{2x+4}$

$Domain:\quad 2x+4\geq 0$

$2x\geq -4$

$x\geq -2$

$D=[-2,\infty)$

10) Find a linear equation given the following two function values. (7 points)

$f(-2)=5$ and $f(3)=-10$

These function values are points (-2, 5) and (3,-10).

$m=\frac{-10-5}{3-(-2)}=\frac{-15}{5}=-3$

Using point $(-2,5)$...

$y-5=-3(x-(-2))$

$y-5=-3(x+2)$

$y-5=-3x-6$

$y=-3x-1$

Choice D

A. $y=-3x-11$
B. $y=-\frac{1}{3}x-\frac{17}{3}$
C. $y=-\frac{1}{3}x+\frac{13}{3}$
D. $y=-3x-1$
E. $y=3x+11$

11) Given a function $y = f(x)$. How would the graph of the function $y = f(x-3)-2$ compare to the graph of function *f*?
(6 points)

A. Shifted 3 units left and shifted 2 units down
B. Shifted 3 units right and shifted 2 units up
C. Shifted 3 units right and shifted 2 units down
D. Shifted 3 units left and shifted 2 units up
E. None of the above.

Do the 'opposite' of what is 'inside' the grouping. The graph or function is shifted 3 units to the right first.

Then the -2 outside the parentheses states that the function or graph is shifted 2 units down.

Choice *C*

12) Point $A\ (-2,5)$ is on the graph of function *g*. Find the corresponding point on the graph of $y = 2g(x-1)+4$.
(7 points)

The -1 inside the grouping indicates the function is shifted 1 units right first.

The *y*-coordinates have been vertically stretched by a factor of 2, then shifted up 4 units.

x-coordinate : -2 + 1 = -1
y-coordinate: 2(5) + 4 = 14

Corresponding point is (-1, 14)

13) If $f(x) = 2x^2 - 5x$, find $f(3a+2)$.
(7 points)

$$\begin{aligned} f(3a+2) &= 2(3a+2)^2 - 5(3a+2) \\ &= 2(9a^2+6a+6a+4) - 5(3a+2) \\ &= 2(9a^2+12a+4) - 5(3a+2) \\ &= 18a^2+24a+8-15a-10 \\ &= 18a^2+9a-2 \end{aligned}$$

14) Find all solutions of the following equation.
(7 points)

$x^4 - 10x^2 + 24 = 0$ Let $u = x^2$

$u^2 - 10u + 24 = 0$

$(u-6)(u-4) = 0$

$u - 6 = 0$ or $u - 4 = 0$

$u = 6$ $u = 4$

$x^2 = 6$ $x^2 = 4$

$x = \pm\sqrt{6}$ $x = \pm\sqrt{4}$

$x = -\sqrt{6},\ \sqrt{6},\ 2,\ -2$

Choice *E*

A. $x = 2i, -2i, \sqrt{6}, -\sqrt{6}$

B. $x = 2, -2, 6$

C. $x = 2, -2$

D. $x = 4, 6$

E. $x = 2, -2, \sqrt{6}, -\sqrt{6}$

15) Find the distance (in simplified form) between points $(0,-7)$ and $(3,-4)$.
(6 points)

$d = \sqrt{(3-0)^2 + (-4-(-7))^2}$

$= \sqrt{3^2 + 3^2}$

$= \sqrt{18}$

$= \sqrt{9 \cdot 2}$

$= 3\sqrt{2}$

A. $\sqrt{130}$

B. 3

C. $7\sqrt{2}$

D. $3\sqrt{2}$

E. $\sqrt{180}$