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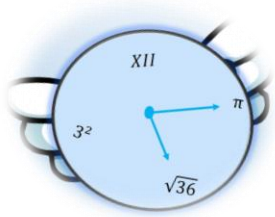

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About this product: ***ACT Prep II has 26 questions covering the following topics: functions, algebraic and geometric transformations, graphing, exponent rules, slope, midpoint, quadratic formula, geometric sequences and more! The answer key comes with explanations for each problem! Standards are included so student can determine weaknesses.***

Name: _____ ACT Prep #2

1. If $f(x) = (2x - 5)^2$, then $f(-1) =$ _____

2. If $f(x) = 4x + 3$ and $g(x) = 4x^2$, $g(f(x)) =$ _____

3. What is the 9^{th} term in the geometric sequence: 2, -4, 8, -16… _____

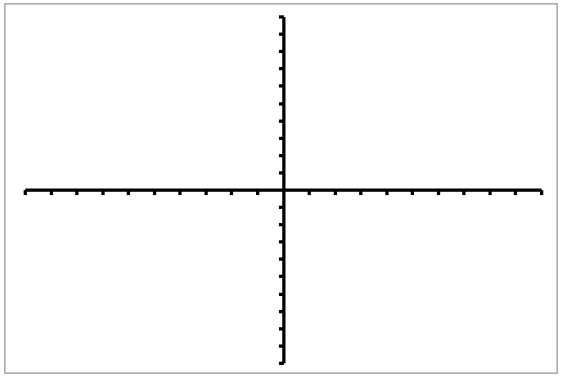
4. What is the 20^{th} term in the geometric sequence in #3? _____

5. Write an equation for the following table:

a	1	3	5	7
b	5	10	15	20

6. Create a graph and a table for $f(x) = 2x + 6$

x	-3	-2	-1	0
f(x)				



Name: _____ ACT Prep #2

7. Phone A is $60 and phone B is $100. Fifty phones have been purchased. The total cost was $3400. How many of each type of phone was purchased?

8. Jeff is twice as old as Sherry. Their combined age is 72. How old is each person?

9. Simplify:

a) $m^b + m^b =$ _____

b) $(m^b)(m^b) =$ _____

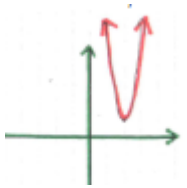
c) $\frac{m^7}{m^4} =$ _____

d) $\frac{m^2}{m^5} =$ _____

e) $(b^m)^c =$ _____

f) True or False? $(m^b)(n^b) = (mn)^b$
explain:

10. Kyle drew the following graphs. State how many solutions each graph has and name the type of solution (real, not real, positive, negative)



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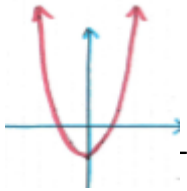

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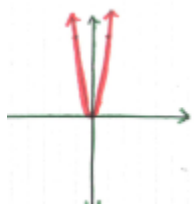


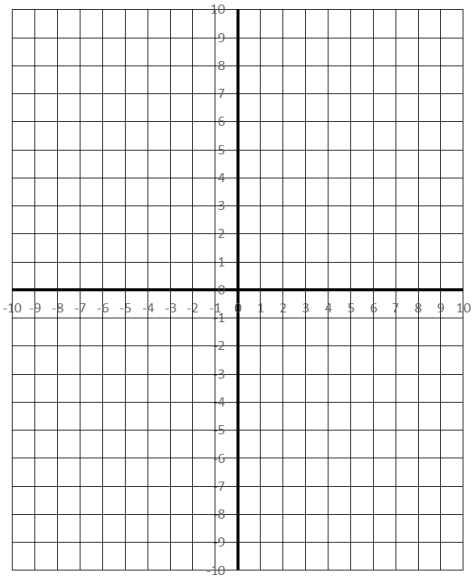
_____

Name: _____ ACT Prep #2

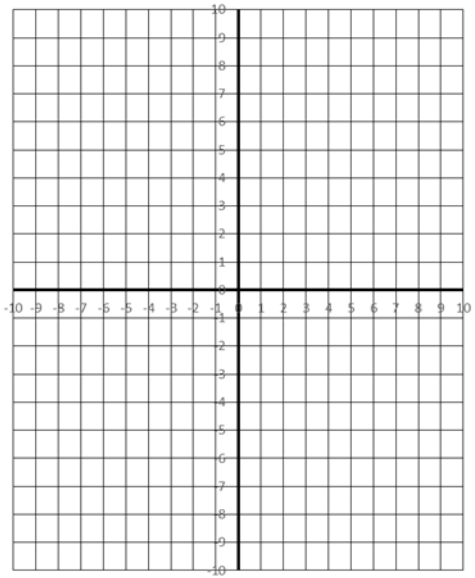
11. Which is the product of the complex numbers: (-2i - 4)(2i - 4)?

a) 4i – 16 b) $-4i^2 + 8$ c) c) 20 d) 1

12. Graph 2x – 3y > 6



13. Plot the following points and connect as you go. Label each point. W(1,1) O(2,3) R(5,3) M(8,0)



14. Find the slope of RM and OW in #13.

RM = _____ OW = _____

15. Reflect WORM across the x-axis and write the new ordered pairs: _____

16. What is the midpoint of the original WM? _____

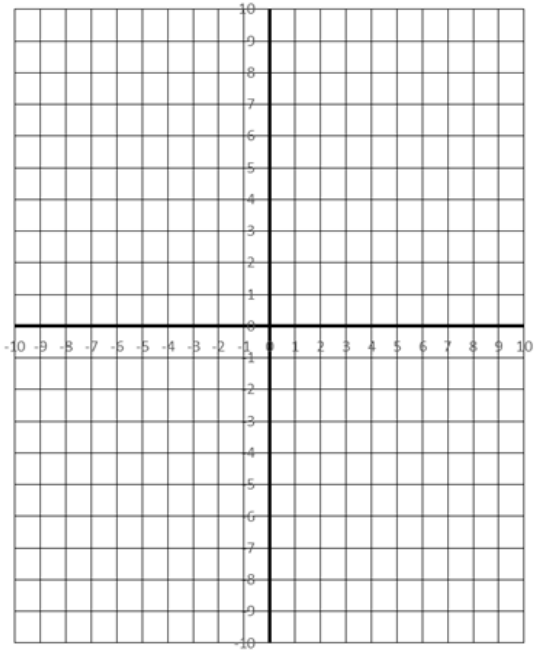
Name: _____ ACT Prep #2

17. Use the quadratic formula to find the solutions for $f(x) = 3x^2 - 6x - 7$

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

18. Given that $x\begin{bmatrix} 4 & 1 \\ 2 & 3 \end{bmatrix} = \begin{bmatrix} 8 & a \\ c & g \end{bmatrix}$ for some real number x, what is a + c + g?

19. Graph the system
$(x - 3)^2 + (y + 4)^2 = 16$
$y = -x + 2$



20. Using the graph from #19, shade the portion that would represent:
$(x - 3)^2 + (y + 4)^2 \leq 16$
$y \geq -x + 2$

Name: _____ ACT Prep #2

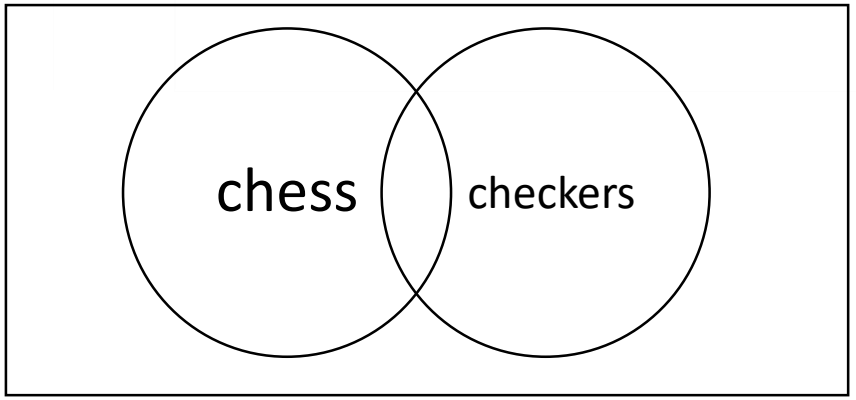
Graph on a number line:

21. $|x + 3| \geq 2$

22. $|x + 3| < -1$

23. 120 people were polled and asked if they had ever played chess or checkers. Draw a Venn Diagram using the results below:

Question	Yes	No
1. Have you every played chess or checkers?	105	15
2. If you answered yes to #1, have you played chess?	42	63
3. If you answered yes to #1, have you play checkers?	77	28



24. Find the solution: $-3 < 2 - 4x < 14$

25. Describe the transformation from the parent function:

a) $f(x) = (x - 3)^2 + 2$

b) $g(x) = -|x + 1| - 4$

26. Graph the sine and cosine parent functions below:

Answer Keys

The answers are in red and the explanations are in blue.

KEY WITH EXPLANATIONS

1. If $f(x) = (2x - 5)^2$, then $f(-1) = 49$

Plug -1 in for the x to get $(2\cdot(-1)-5)^2 = (-7)^2 = 49$

2. If $f(x) = 4x + 3$ and $g(x) = 4x^2$, $g(f(x)) = 64x^2+96x+36$

Plug the f(x) equation in for x in the g(x) equation to get: $4(4x+3)^2 = 4(4x+3)(4x+3) = 4(16x^2+24x+9) = 64x^2+96x+36$

3. What is the 9th term in the geometric sequence: 2, -4, 8, -16… = 512

Use the formula: $a_n = a_1 r^{n-1} so\ a_9 = 2(-2)^{9-1}$ or notice that each number is being multiplied by -2 and find each term until you get to the 9th term: 2, -4, 8, -16, 32, -64, 128, - 256, 512

4. What is the 20th term in the geometric sequence in #3? = -1048576

Use the formula: $a_n = a_1 r^{n-1} so\ a_{20} = 2(-2)^{20-1}$ = -1048576

5. Write an equation for the following table: y = 2.5x+2.5

a	0	1	3	5	7
b	2.5	5	10	15	20

+2 +2 +2 ΔY

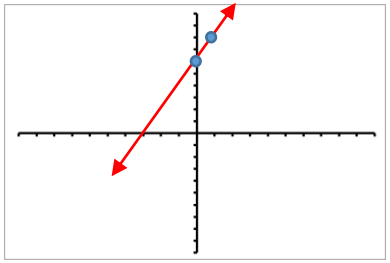
+5 +5 +5 ΔX

Use y = mx + b. The m is the slope which can be found by using $\frac{\Delta Y}{\Delta X}$ so $\frac{5}{2}$ or 2.5.

The y-intercept or b can be found by backtracking in the table and find the number in the pattern opposite 0.

6. Create a graph and a table for f(x) = 2x + 6

x	2(-3)+6 -3	2(-2)+6 -2	2(-1)+6 -1	2(0)+6 0
f(x)	0	2	4	6



Use your graphing calculator or plug in the x's from the table to find the f(x). Use the slope and y-intercept to graph. Go up 6 on the y-axis, then from there go up 2, right 1. You could also you the table to graph.

7. Phone A is $60 and phone B is $100. Fifty phones have been purchased. The total cost was $3400. How many of each type of phone was purchased? A = 40 and B = 10

Set up a system. 50 phones were sold consisting of each type so you can write: A + B = 50

Phone A was $60 and phone B was $100, and the total cost was $3400, so write: 60A + 100B = 3400

Systems can be solved graphically, by using substitution or elimination or by using the matrix method. The matrix method is a quick way of solving since they equations are both in standard form and you can use a calculator on the ACT. Look up how to find the answer using a matrix for the calculator that you will be using.

8. Jeff is twice as old as Sherry. Their combined age is 72. How old is each person? s = 24 and j = 48

This is also a system. Use these two equations: 2s = j and s + j = 72

A quick method would be substitution. Plug 2s in for j into the 2nd equation. s + 2s = 72 so 3s = 72 so s = 24.

Now that you know s, plug in 24 for s in the first equation: 2(24) = j so 48 = j.

9. Simplify: (You need to know your exponent rules for this group of problems.)

a) $1m^b + 1m^b = 2m^b$

Like terms so add coefficients.

b) $(m^b)(m^b) = m^{2b}$

On multiplication problems, add exponents.

c) $\frac{m^7}{m^4} = m^3$

On division problems, subtract exponents.

d) $\frac{m^2}{m^5} = \frac{1}{m^3}$

Same as c, subtract exponents. This answer could also be written as m^{-3}

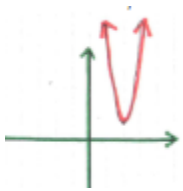
e) $(b^m)^c = b^{mc}$

This is a power to a power, so multiply exponents

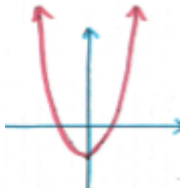
f) True or False? $(m^b)(n^b) = (mn)^b$

explain: TRUE (Power to a Power, so multiply)

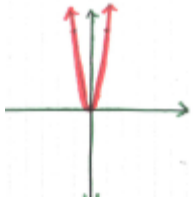
10. Kyle drew the following graphs. State how many solutions each graph has and name the type of solution (real, not real (imaginary), positive, negative)



No solution or non-real solutions which would be imaginary solutions.



2 solutions: 1 negative real and 1 positive real.



1 real

The solution is where the curve crosses the x-axis. If it does not touch the x-axis, then the solution is imaginary. The answer would be something like $\pm 2i$. If the graph touches the x-axis twice, there are two real solutions and if the graph only touches the x-axis at it's vertex, then there is one real solution.

11. Which is the product of the complex numbers: (-2i - 4)(2i - 4)?

a) 4i – 16 b) $-4i^2 + 8$ c) c) 20 d) 1

FOIL: (-2i – 4)(2i – 4)

-2i(2i – 4) – 4(2i – 4)

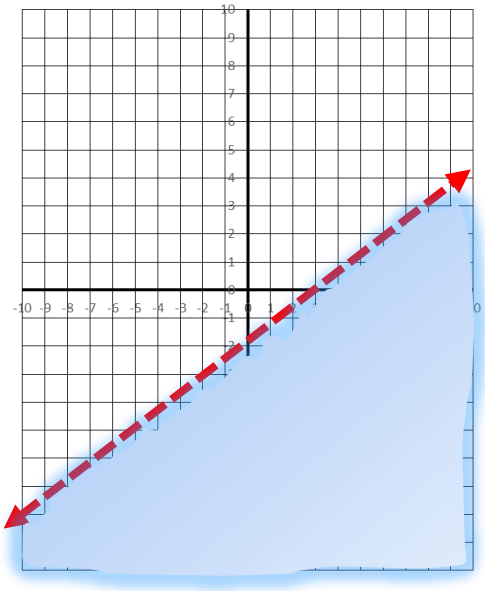
$-4i^2 + 8i - 8i + 16$

$i^2 = -1$ for imaginary numbers! So substitute -1 in!

-4(-1) + 16

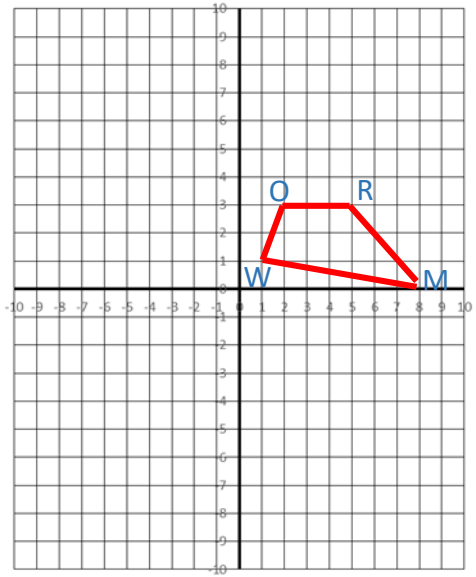
4 + 16 = 20

12. Graph $2x - 3y > 6$



Solve for y
$2x - 3y > 6$
$-3y > -2x + 6$
$y < \frac{2}{3}x - 2$ (when dividing by a negative, the inequality flips)
Draw a dotted line and shade below.

13. Plot the following points and connect as you go. Label each point. W(1,1) O(2,3) R(5,3) M(8,0)



14. Find the slope of RM and OW in #13. For slope either use the formula $\frac{y_2 - y_1}{x_2 - 2_1}$ or count rise over run.

RM =-1 OW = 2 For RM, count down 3, right 3, so rise is -3 and run is 3, which reduces to -1. For OW, the rise is 2 and the run is 1 which reduces to 2.

15. Reflect WORM across the x-axis and write the new ordered pairs: W'(1,-1) O'(2,-3) R'(5,-3) M,(8,0)

All the x-coordinates of the original ordered pairs will stay the same and the y-coordinates will become the opposite.

16. What is the midpoint of the original WM? $(\frac{9}{2}, \frac{1}{2})$

Use the midpoint formula: $(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2})$ so $(\frac{1+8}{2}, \frac{1+0}{2})$

17. Use the quadratic formula to find the solutions for $f(x) = 3x^2 - 6x - 7$ about 2.826 and -0.826

$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ a = 3, b = -6, c = -7 so $\frac{6 \pm \sqrt{(-6)^2 - 4(3)(-7)}}{2(3)} = \frac{6 \pm \sqrt{120}}{6} \approx 2.826$ and -0.826

18. Given that $x\begin{bmatrix} 4 & 1 \\ 2 & 3 \end{bmatrix} = \begin{bmatrix} 8 & a \\ c & g \end{bmatrix}$ for some real number x, what is a + c + g? 12

Set up equations for two things you know to solve for x. For instance the 4 and 8 are in the same position, so 4x = 8 would mean that x = 2.

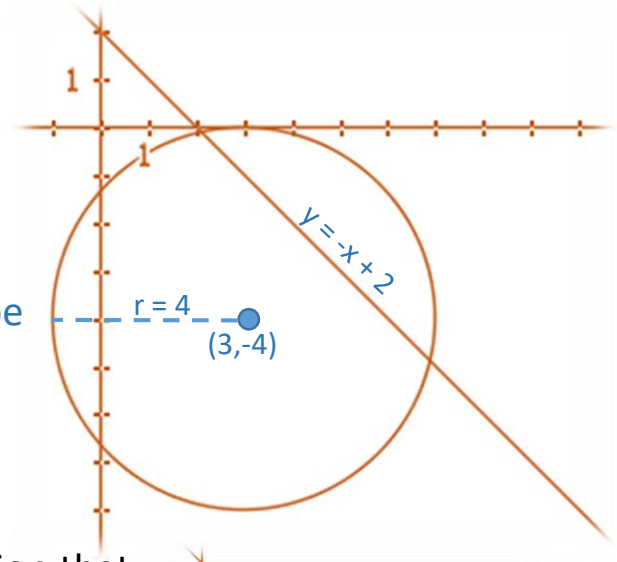
For a, multiply 1 times 2 to get a = 2
For c, multiply 2 times 2 to get c = 4
For g, multiply 3 times 2 to get g = 6
Add 2 + 4 + 6 to get 12.

19. Graph the system

$(x - 3)^2 + (y + 4)^2 = 16$

$y = -x + 2$.

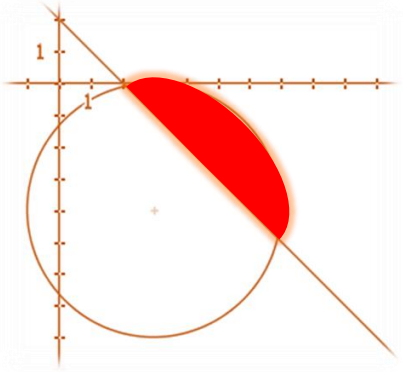
Use the first equation to draw the circle.
The radius would be 4 and the center would be (3,-4). Now graph the linear function.



20. Using the graph from #19, shade the portion that would represent:

$(x - 3)^2 + (y + 4)^2 \leq 16$

$y \geq -x + 2$



KEY WITH EXPLANATIONS

Graph on a number line:

21. $|x + 3| \geq 2$

$x + 3 \geq 2$ $\quad$ $x + 3 \leq -2$

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

Notice how the inequality changes and the sign changes on the second equation!

On absolute value problems, set up two equations as seen, then graph.

$x \leq -5$ solid dot on -1 and shade to the left.

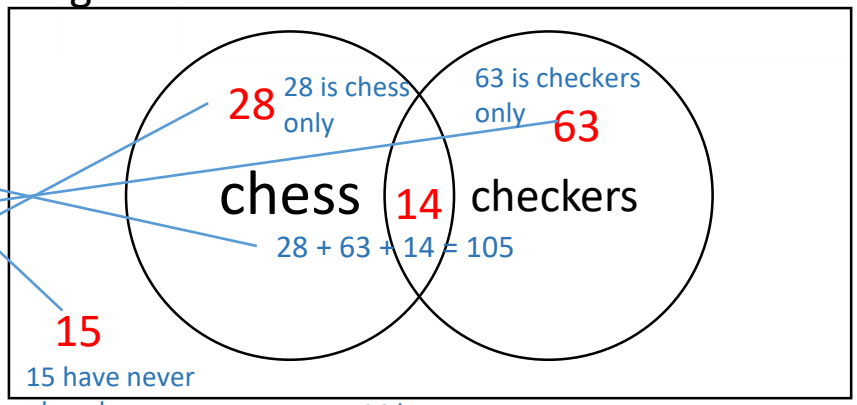
$x \geq -1$ solid dot on -1 and shade to the right.

22. $|x + 3| < -1$

no solution…absolute values cannot be less than 0

23. 120 people were polled and asked if they had ever played chess or checkers. Draw a Venn Diagram using the results below:

Question	Yes	No
1. Have you every played chess or checkers?	105	15
2. If you answered yes to #1, have you played chess?	42	63
3. If you answered yes to #1, have you play checkers?	77	28



24. Find the solution: $-3 < 2 - 4x < 14$ $-3 < x < 5/4$

Set up two equations:

$-3 < 2 - 4x$ $\quad$ $2 - 4x < 14$

$-5 < -4x$ $\quad$ $-4x < 12$

$5/4 > x$ $\quad$ $x > -3$

$-3 < x < 5/4$

25. Describe the transformation from the parent function:

a) $f(x) = (x - 3)^2 + 2$ right 3 and up 2

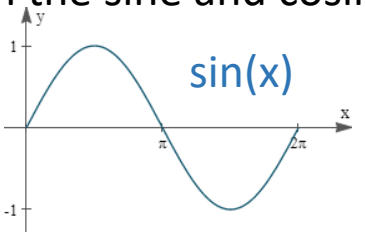
opposite of what you think

up and down and does what you think

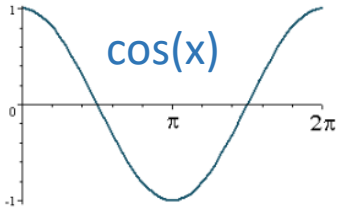
b) $g(x) = -|x + 1| - 4$ reflection over x-axis, left 1 and down 4

makes the function flip

26. Graph the sine and cosine parent functions below:



sin(x)



cos(x)

Name: _____ ACT Prep #2

Fill out the chart to determine which reporting category needs more attention.

PHM = Preparing for Higher Math

N = Number and Quantity _____ out of 7 correct = _____%

F = Functions _____ out of 9 correct = _____%

G = Geometry _____ out of 2 correct = _____%

A = Algebra _____ out of 9 correct = _____%

S = Statistics _____ out of 1 correct = _____%

IES = Integrating Essential Skills _____ out of 2 correct = _____%

MDL = Modeling _____ out of 3 correct = _____%
(each modeling item is also a part of another category)

Name: _____ Answer Document – ACT Prep #2

1.	49	**F**
2.	$64x^2+96x+36$	**F**
3.	512	**F**
4.	-1048576	**F**
5.	y = 2.5x+2.5	**A**
6.	See the other answer key	**A**
7.	A = 40 and B = 10	**A**
8.	s = 24 and j = 48	**A**
9A.	$2m^b$	**N**
9B.	m^{2b}	**N**
9C.	m^3	**N**
9D.	$\frac{1}{m^3}$	**N**
9E.	True, Power to a power.	**N**
10.	See the other answer key	**F**
11.	20	**N**
12.	See the other answer key	**A**
13.	See the other answer key	**A**
14.	RM =-1 OW = 2	**F**
15.	W'(1,-1) O'(2,-3) R'(5,-3) M,(8,0)	**G**
16.	$(\frac{9}{2}, \frac{1}{2})$	**G**
17.	about 2.826 and -0.826	**F**
18.	12	**N**
19.	See the other answer key	**A**
20.	See the other answer key	**A**
21.	See the other answer key	**IES MDL**
22.	No solution	**IES MDL**
23.	See the other answer key	**S MDL**
24.	-3 < x < 5/4	**A**
25.	a) Right 3 up 2 b) Reflect over x, left 1, down 4	**F**
26.	See the other answer key	**F**

Name: _____ Answer Document – ACT Prep #2

1.		**F**
2.		**F**
3.		**F**
4.		**F**
5.		**A**
6.		**A**
7.		**A**
8.		**A**
9A.		**N**
9B.		**N**

9C.		**N**
9D.		**N**
9E.		**N**
10.		**F**
11.		**N**
12.		**A**
13.		**A**
14.		**F**
15.		**G**
16.		**G**

17.		**F**
18.		**N**
19.		**A**
20.		**A**
21.		**IES MDL**
22.		**IES MDL**
23.		**S MDL**
24.		**A**
25.		**F**
26.		**F**