

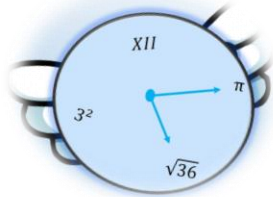
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About this product:

ACT Prep I has 30 questions that cover statistics, probability, number sense, plug and chug, reading tables and charts, scientific notation and more! The answer key comes with explanations for each problem! Standards are included so student can determine weaknesses.

Name: _____

ACT Prep #1

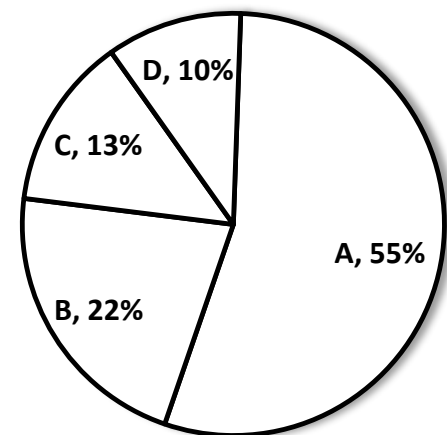
A new company collected data on the number of products sold in their first 10 days of business. Use the table to answer the following: (show your work under each problem)

1. Find the difference in the mean and the median. _____
2. What percent of the total products sold occurred on the 10th day? _____

Day	Number Sold
1	2
2	15
3	7
4	6
5	11
6	29
7	4
8	7
9	5
10	12

3. The same company collected data on four of the most popular items for the first year as seen in the pie chart. If 2450 of these items were sold, then how many more of Item A was sold than Item D?

4. The company is thinking about holding a sale. One particular item is already 25% of the original price of \$32. The company decides to allow an extra 10% to be taken off of the sale price. A customer argues with the sales person that the price should now be 35% of the original. What is wrong with this argument?



Name: _____

5. On a map, two cities are 3.5 inches apart. If $\frac{1}{2}$ inch is equal to 25 miles, then how far apart are the cities?

6. Roger has a scale drawing of a birdhouse. He is showing that the actual length of the house will be 8 inches and the actual height of the house will be 10.5 inches. Roger measured the length of the house on his paper and it was 5 cm. What should the measure of the height of the house be on his paper drawing?

7. Roger plans to build birdhouses for a local store. If he charges the store a fixed \$50 set-up fee and \$15 for each house, then how many houses did Roger build if he received \$1025?

8. When Roger builds birdhouses, he spends much of his time measuring. He needs to know the exact middle of these two measurements: $1\frac{1}{8}$ inches and $3\frac{1}{4}$ inches.

9. People like Roger need to have something called number sense. People with good number sense would be able to put these fractions in ascending order: $\frac{1}{3}$, $\frac{2}{5}$, $\frac{5}{2}$, $\frac{1}{8}$, $\frac{2}{3}$, $\frac{9}{10}$ See if you have good number sense!

10. One light year is about 5,879,000,000,000 miles. How would this be written in scientific notation?

11. A nanometer is 0.000000001 meters. How is this written in scientific notation?

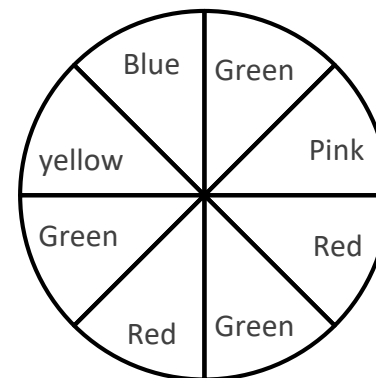
Name: _____

12. Find the sum and product of these two numbers:

4.38 and 56.4

13. A spinner has 8 equal sections with the colors shown.

- a) What is the probability of the spinner landing on a red section?
- b) What is the probability of landing on a green section?
- c) What is the probability of landing on a yellow, blue or pink section?
- d) What is the probability of not landing on a red section?



14. Simplify: $2c(3cd - 4d + cd^2 - \frac{3}{2})$

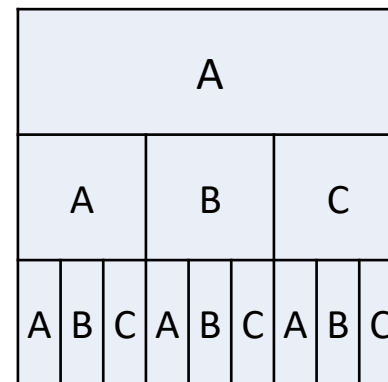
15. Simplify: $\frac{2}{\sqrt{3}} + \frac{3}{\sqrt{2}}$

Name: _____

16. If $c:d = 3:4$ and $d:e = 2:3$, then what is $c:e$?

17. If every 9 days, a dog eats 3.5 pounds of food, then how much will the dog eat in $4 + d$ days? Write the answer in terms of "d".

18. The square is divided into 3 rows of equal length. The second row is divided into 3 equal sections and the 3rd row is divided into 9 equal sections. What fraction is the square's area in a region labeled A?



19. In a math experiment, Jason has to answer 3 multiple choice questions that have 4 possible answers of which only one is correct. For each problem. If Jason randomly picks answers for each of the problems, what is the probability that all answers will be correct?

20. A vial is $\frac{1}{8}$ full of solution. After 8 tablespoons of solution have been added, the vial is now $\frac{3}{4}$ full. What is the volume of the vial in tablespoons?

Name: _____

Use < or >

21. $|-4|$ _____ -3

22. $\frac{4}{7}$ _____ $\frac{2}{9}$

23. $\sqrt{10}$ _____ π

24. 1.346 _____ 1.364

25. Given: $p = r^2u$

Find u if $r = -9$ and $p = 486$.

26. Amy will receive a 3% raise. If her pay was \$15 an hour, what will she make per hour after the raise?

Solve:

27. $|x + 4| = 10$ (two answers)

Weight of box (pounds)	Fee	Price per pound
Less than 20	\$10.00	\$1.00
20 – 50	\$20.00	\$0.75
More than 50	\$45.00	\$0.60

28. Todd has a coin collection that needs to be shipped to his new residence. Mail 'N Go charges a one time fee plus a price per pound. Todd has 3 boxes that weigh about 8 pounds a piece. He plans to ship the three boxes together in one big box. What will Todd be charged to ship his coins?
29. A roller coaster ride goes from 51 feet per second to 114 feet per second in 3.8 seconds. Assuming the acceleration is constant what is the acceleration in feet per second per second from 51 fps to 114 fps?
30. Joe makes a profit of $400c - c^2$ dollars for selling his sculptures. If c represents a sculpture, then what will his profit be if he sells 300 sculptures?

Answer Keys

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

KEY WITH EXPLANATIONS

ACT Prep #1

A new company collected data on the number of products sold in their first 10 days of business. Use the table to answer the following: (show your work under each problem)

Day	Number Sold
1	2
2	15
3	7
4	6
5	11
6	29
7	4
8	7
9	5
10	12

1. Find the **difference** in the mean and the median. **2.8**

$$\text{mean} = 98/10 = 9.8 \quad \text{median} = 7$$

Mean: Average the numbers (find the sum and divide by the total numbers)

Median: Put the numbers in order from least to greatest and find the middle number.

Mode: The numbers that occur the most.

Range: Largest number minus smallest number

2. **What percent of the total products sold occurred on the 10th day?** **12.2%**

Find what $12 \div 98$ is. (12 came from day 10 and 98 is the sum)

What percent of the total products is the 10th day?

“what” is the variable

“of” is multiply

“is” is equal

x% of 98 is 12

$$(x)(98) = 12$$

Solve by dividing 12 by 98 then multiply by 100 to find the %

or use: $\frac{\text{is}}{\text{of}} = \frac{\%}{100}$

$$\frac{12}{98} = \frac{x}{100}$$

KEY WITH EXPLANATIONS

ACT Prep #1

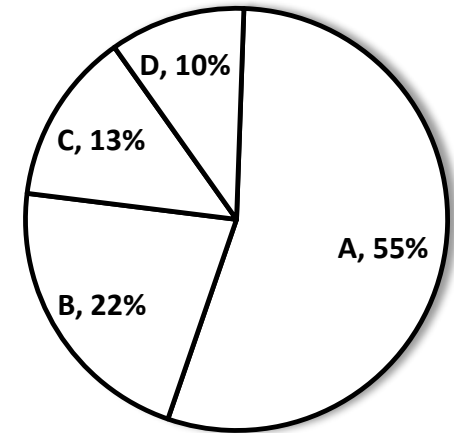
3. The same company collected data on four of the most popular items for the first year as seen in the pie chart. If 2450 of these items were sold, then how many more Item A's were sold than Item D's? $1347.5 - 245 = \mathbf{1102.5}$ but you can't sell half an items so round. Is it better to round up or down? You decide. The 1347.5 came from multiplying 0.55 times 2450. This is how to find 55% of the total. The 245 came from finding 10% of 2450, so multiply 0.10 times 2450. To find out how many more item A's were sold than D's, you must subtract.

4. The company is thinking about holding a sale. One particular item is already 25% off the original price of \$32. The company decides to allow an extra 10% to be taken off of the sale price. A customer argues with the sales person that the price should now be 35% off the original. What is wrong with this argument? You get two different answers. 25% off \$32 is $32 - 8 = 24$. Take another 2.4 off for the 10% and you get a price of $\mathbf{\$21.60}$. 35% off will be $32 - 11.2 = \mathbf{\$20.80}$.

The key is that 25% comes off the original, THEN 10% comes off of that sales price. This is not the same as taking 35% off the original.

$0.25 \times \$32 = \8 so take \$8 off of \$32 to get the new price of $32 - 8 = \$24$. Now take 10% off of the \$24 that was just calculated: $0.10 \times 24 = 2.4$ so $24 - 2.4 = \mathbf{21.60}$.

A straight 35% off of the original \$32 would be: $0.35 \times \$32 = \11.20 . $32 - 11.20 = \mathbf{20.80}$. Not the same answer!



KEY WITH EXPLANATIONS

ACT Prep #1

5. On a map, two cities are 3.5 inches apart. If $\frac{1}{2}$ inch is equal to 25 miles, then how far apart are the cities?

175 miles

Set up a proportion: (The key is to be consistent. **Inches** are in the numerators of the fractions and **miles** are in the denominators of the fractions in this example.)

$$\frac{.5}{25} = \frac{3.5}{x} \quad \text{so } .5x = 87.5 \quad \text{now divide } 87.5 \text{ by } .5 \text{ and get } 175 \text{ miles}$$

6. Roger has a scale drawing of a birdhouse. He is showing that the actual length of the house will be 8 inches and the actual height of the house will be 10.5 inches. Roger measured the length of the house on his paper and it was 5 cm. What should the measure of the height of the house be on his paper drawing?

about 6.6 cm

Set up a proportion: (The key is to be consistent. **Lengths** are in the numerators of the fractions and **heights** are in the denominators of the fractions in this example.)

$$\frac{8}{10.5} = \frac{5}{x} \quad \text{so } 8x = 52.5 \quad \text{now divide } 52.5 \text{ by } 8 \text{ and get } 6.5625 \text{ cm which rounds to } 6.6.$$

7. Roger plans to build birdhouses for a local store. If he charges the store a fixed \$50 set-up fee and \$15 for each house, then how many houses did Roger build if he received \$1025?

65 houses

fixed fee + \$15 for each house = 1025

$$50 + 15h = 1025$$

$$15h = 975 \text{ (subtract } 1025 - 50)$$

$$h = 65 \text{ (divided } 975 \text{ by } 15)$$

8. When Roger builds birdhouses, he spends much of his time measuring. He needs to know the exact middle of these two measurements: $1 \frac{1}{8}$ inches and $3 \frac{1}{4}$ inches.

$2 \frac{3}{16} = 2.1875$ inches

To find the middle of something, you can add the numbers and divide by two (same as taking the average).

$$\begin{array}{r} 1 \frac{1}{8} \\ + 3 \frac{1}{4} \\ \hline \end{array}$$

find a common denominator for 8 and 4

$$\begin{array}{r} 1 \frac{1}{8} = 1 \frac{1}{8} \\ + 3 \frac{1}{4} = 3 \frac{2}{8} \\ \hline 4 \frac{3}{8} \end{array}$$

Change $4 \frac{3}{8}$ to improper which is $\frac{35}{8}$. Now take $\frac{35}{8} \div 2$ When dividing with fractions use the rule: Keep it, Change it, Flip it!!!

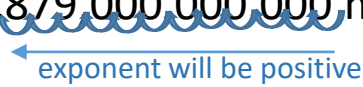
$$\frac{35}{8} \times \frac{1}{2} = \frac{35}{16} \text{ or } 2 \frac{3}{16} = 2.1875$$

9. People like Roger need to have something called number sense. People with good number sense would be able to put these fractions in ascending order: $\frac{1}{3}, \frac{2}{5}, \frac{5}{2}, \frac{1}{8}, \frac{2}{3}, \frac{9}{10}$ See if you have good number sense!

$\frac{1}{8}, \frac{1}{3}, \frac{2}{5}, \frac{2}{3}, \frac{9}{10}, \frac{5}{2}$

Some students find it easy to put all the fractions into decimal form. Just divide numerator by denominator. Visually, this would be a good way to work the problem, but as far as number sense goes, a student should know that when the numerator is larger than the denominator, then that number is more than one. For instance, the $\frac{5}{2}$ has to be the largest number in the group because it is the only one with a numerator larger than the denominator. Students should know the decimals to certain fractions automatically like the $\frac{1}{3}$ and the $\frac{2}{3}$. Another thing about fractions that a person with good number sense should know is that the closer the numerator and denominator are to each other, the closer the number is to 1, and the larger those two numbers are, the closer they are to one. $\frac{2}{3}$ and $\frac{9}{10}$ have numerators and denominators that are only 1 away from each other. Since $\frac{9}{10}$ has a 9 and a 10 in the fraction and those numbers are bigger than 2 and 3 from $\frac{2}{3}$, then $\frac{9}{10}$ has to be larger. Can you think of a logical reason why $\frac{1}{8}$ is the smallest number in the group?

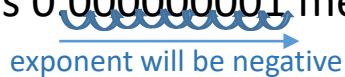
10. One light year is about 5,879,000,000,000 miles. How would this be written in scientific notation?

exponent will be positive

5.879 X 10¹²

Scientific Notation is a way of writing really large or really small numbers in a different way and usually a quicker way. Start at the end of the problem where the last zero is on the right side. This is technically where a decimal is. Think about moving that decimal to the left until you create a number that would be between 1 and 10. If you stopped between the 7 and 9, this number would be 587.9 which is not a number that is between 1 and 10. Keep going until you get to the spot between the 5 and the 8. This number is 5.879 which is a number between 1 and 10. You do not have to list all the repeating zeros after the 9. The decimal needed to be moved 12 times, so 12 is the exponent that goes on the 10. Twelve will be positive because the starting number was bigger than 1.

11. A nanometer is 0.000000001 meters. How is this written in scientific notation?

exponent will be negative

1 X 10⁻⁹

For this problem, start with the decimal and go to the right. Count until you can write a number that would be between 1 and 10. If you stop before the 1, you would have .1 which is not between 1 and 10. Stop after the 1. It took 9 spaces to get there and since you started with a very tiny number that was less than one, the exponent will be negative.

12. Find the sum and product of these two numbers:

4.38 and 56.4

sum(add): 60.78 product(multiply): 247.032

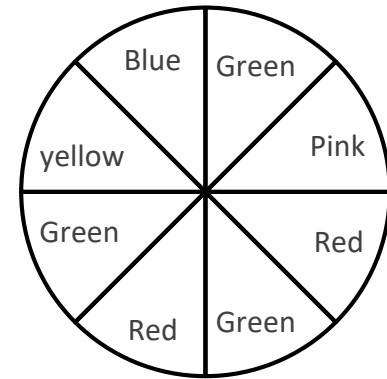
13. A spinner has 8 equal sections with the colors shown.

a) What is the probability of the spinner landing on a red section? $\frac{2}{8}$ or $\frac{1}{4}$ Count the number of red sections (2) and write as a fraction over the total sections (8), then reduce.

b) What is the probability of landing on a green section? $\frac{3}{8}$ Count the number of green sections (3) and write as a fraction over the total sections (8).

c) What is the probability of landing on a yellow, blue or pink section? $\frac{3}{8}$ Count the number of yellow, blue and pink sections (3) and write as a fraction over the total sections (8).

d) What is the probability of not landing on a red section? $\frac{6}{8}$ or $\frac{3}{4}$ Count the number of sections that are not red (6) and write as a fraction over the total sections (8). Reduce.



14. Simplify: $2c(3cd - 4d + 1cd^2 - \frac{3}{2}) = 6c^2d - 8cd + 2c^2d^2 - 3c$

Distribute and be mindful of exponent rules. c times c is c². The cd² has no coefficient, so it is an understood 1. After distributing, look to combine like terms. In this case, there are no like terms.

15. Simplify: $\frac{2}{\sqrt{3}} + \frac{3}{\sqrt{2}} = \frac{2\sqrt{2} + 3\sqrt{3}}{\sqrt{6}}$

$\frac{2}{\sqrt{3}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{2\sqrt{2}}{\sqrt{6}}$ $\frac{3}{\sqrt{2}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{3\sqrt{3}}{\sqrt{6}}$

Now you have a common denominator and you can add the numerators.

You must have a common denominator which would be $\sqrt{6}$. In the first fraction's denominator, you would need to multiply the $\sqrt{3}$ by $\sqrt{2}$ to get $\sqrt{6}$. The rule is that whatever you multiply the denominator by, you must multiply the numerator by that same number. Same thing for the second fraction. Finally add the two fractions that now have common denominators.

16. If $c:d = 3:4$ and $d:e = 2:3$, then what is $c:e$? **3:6 or 1:2**

If d was 4 in the 2nd ratio, then e would become 6, so then $c:e$ would be 3:6 or 1:2

17. If every 9 days, a dog eats 3.5 pounds of food, then how much will the dog eat in $4 + d$ days?

Write the answer in terms of "d". **$\frac{14+3.5d}{9}$ pounds or $\frac{14}{9} + \frac{3.5d}{9}$ pounds**

Set up $\frac{9}{3.5} \times \frac{4+d}{x}$ and then cross multiply and get $9x = 14 + 3.5d$ then divide both sides by 9.

KEY WITH EXPLANATIONS

18. The square is divided into 3 rows of equal length. The second row is divided into 3 equal sections and the 3rd row is divided into 9 equal sections. What fraction is the square's area in a region labeled A? $\frac{5}{9}$

The first row which is labeled A is $\frac{1}{3}$ of the whole square.

The second row that is labeled A is $\frac{1}{9}$ of the whole square.

In the third row, there are three sections labeled A that would total $\frac{1}{9}$ of the whole square.

$$\text{Add } \frac{1}{3} + \frac{1}{9} + \frac{1}{9} = \frac{3}{9} + \frac{2}{9} = \frac{5}{9}$$

19. In a math experiment, Jason has to answer 3 multiple choice questions that have 4 possible answers of which only one is correct for each problem. If Jason randomly picks answers for each of the problems, what is the probability that all answers will be correct? $\frac{1}{64}$

One out of 4 answers are correct which would be represented by $\frac{1}{4}$.

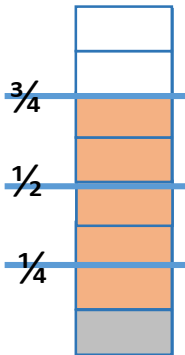
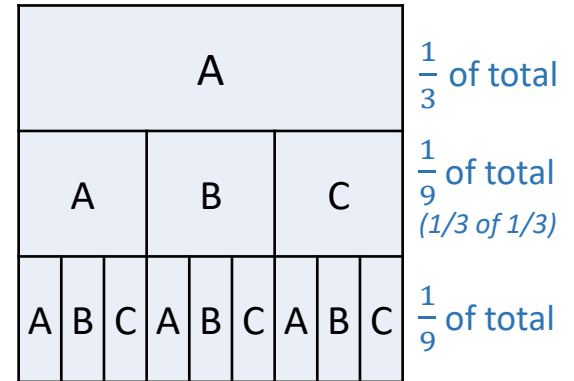
There are three questions so multiply $\frac{1}{4} \times \frac{1}{4} \times \frac{1}{4}$ which equals $\frac{1}{64}$.

20. A vial is $\frac{1}{8}$ full of solution. After 8 tablespoons of solution have been added, the vial is now $\frac{3}{4}$ full. What is the volume of the vial in tablespoons? **9.6 tablespoons**

According to the picture, $\frac{5}{8}$ or .625 is the same as 8 tablespoons, so how many tables spoons in $\frac{3}{4}$ or .75?

Set up this proportion to find the answer: $\frac{8}{.625} = \frac{x}{.75}$ to get 9.6 tablespoons.

ACT Prep #1



KEY WITH EXPLANATIONS

ACT Prep #1

Use < or >

$$21. |-4| > -3$$

Absolute value means distance away from zero. -4 is 4 units away from zero. So 4 is greater than -3.

$$23. \sqrt{10} > \pi$$

$\sqrt{10}$ is about 3.162 and is bigger than π which is about 3.1416

$$25. \text{ Given: } p = r^2u$$

Find u if $r = -9$ and $p = 486$. $u = 6$

Plug into the equation:

$$486 = (-9)^2u$$

$$486 = 81u$$

$$u = 6$$

26. Amy will receive a 3% raise. If her pay was \$15 an hour, what will she make per hour after the raise? **\$15.45**

$$15 \times .03 = .45$$

$$\text{so } .45 + 15 = 15.45$$

$$\text{or } 15 \times 1.03 = 15.45$$

$$22. \frac{4}{7} > \frac{2}{9}$$

$\frac{4}{7} \approx .571$ and $\frac{2}{9} \approx .222$, so .571 is greater than .222.

$$24. 1.346 < 1.364$$

Compare each digit starting from the left. When you get to numbers that are different, decide which is larger.

Solve:

27. $|x + 4| = 10$ (two answers) $x = 6$ and -14

On absolute value problems, isolate the absolute value first, then set it equal to the positive and negative of the original number after the equal sign.

$x + 4 = 10$

$x = 6$

$x + 4 = -10$

$x = -14$

Weight of box (pounds)	Fee	Price per pound
Less than 20	\$10.00	\$1.00
20 – 50	\$20.00	\$0.75
More than 50	\$45.00	\$0.60

28. Todd has a coin collection that needs to be shipped to his new residence. Mail 'N Go charges a one time fee plus a price per pound. Todd has 3 boxes that weigh about 8 pounds a piece. He plans to ship the three boxes together in one big box. What will Todd be charged to ship his coins? **\$38.00**

3 boxes times 8 pounds would be 24 pounds

$$20 + 24(.75) = \$38$$

29. A roller coaster ride goes from 51 feet per second to 114 feet per second in 3.8 seconds. Assuming the acceleration is constant what is the acceleration in feet per second per second from 51 fps to 114 fps? ≈ 16.6

Find the difference in the speeds, then divide by the time. $114 - 51 = 63$ then $\frac{63}{3.8} \approx 16.6 \text{ f/s}^2$

30. Joe makes a profit of $400c - c^2$ dollars for selling his sculptures. If c represents a sculpture, then what will his profit be if he sells 300 sculptures? $\$30,000$

Plug 300 in for all the c 's: $400(300) - (300)^2 = 120,000 - 90,000 = 30,000$

Name: _____

ACT Prep #1

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

PHM = Preparing for Higher Math

N = Number and Quantity _____ out of 6 correct = _____%

A = Algebra _____ out of 6 correct = _____%

S = Statistics _____ out of 7 correct = _____%

(problem 13 has 4 answers)

IES = Integrating Essential Skills _____ out of 14 correct = _____%

MDL = Modeling _____ out of 9 correct = _____%

(each modeling item is also a part of another category)

Name: _____

ACT Prep #1

1.	2.8	S MDL
2.	12.2 %	S MDL
3.	about 1102	IES MDL
4.	You get two different answers.	IES MDL
5.	175 miles	IES
6.	about 6.6 cm	IES
7.	65 houses	A
8.	$2\frac{3}{16} = 2.1875$ inches	IES
9.	$\frac{1}{8}'$, $\frac{1}{3}'$, $\frac{2}{5}'$, $\frac{2}{3}'$, $\frac{9}{10}'$, $\frac{5}{2}'$	IES
10.	5.879×10^{12}	A

11.	1×10^{-9}	A
12.	60.78, 247.032	IES
13.	a) $\frac{1}{4}$ b) $\frac{3}{8}$ c) $\frac{3}{8}$ d) $\frac{3}{4}$	S
14.	$6c^2d - 8cd + 2c^2d^2 - 3c$	A
15.	$\frac{2\sqrt{2} + 3\sqrt{3}}{\sqrt{6}}$	N
16.	1:2	IES
17.	$\frac{14+3.5d}{9}$ pounds	IES MDL
18.	$\frac{5}{9}$	IES
19.	$\frac{1}{64}$	S MDL
20.	9.6 tablespoons	IES MDL

21.	>	N
22.	>	N
23.	>	N
24.	<	N
25.	$u = 6$	IES
26.	\$15.45	IES MDL
27.	$x = 6$ and -14	A
28.	\$38.00	IES MDL
29.	≈ 16.6	N
30.	\$30,000	A

Name: _____

Answer Document – ACT Prep #1

1.		S MDL
2.		S MDL
3.		IES MDL
4.		IES MDL
5.		IES
6.		IES
7.		A
8.		IES
9.		IES
10.		A

11.		A
12.		IES
13.		S
14.		A
15.		N
16.		IES
17.		IES MDL
18.		IES
19.		S MDL
20.		IES MDL

21.		N
22.		N
23.		N
24.		N
25.		IES
26.		IES MDL
27.		A
28.		IES
29.		N
30.		A