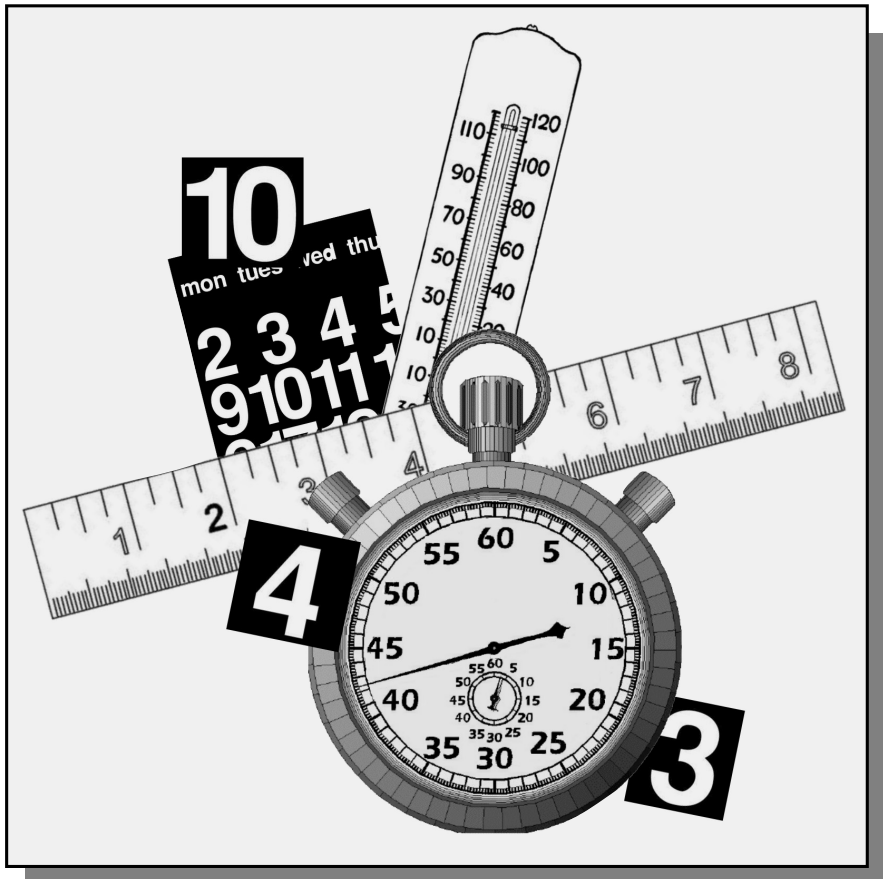
Intermediate Math Skills

Activities



Chapter 1

IMS: 76041 Revision: 030208

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Intermediate Math Skills

Chapter 1

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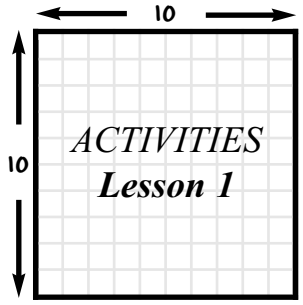
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Predictions

Chance



You are making progress! ***Answer the following questions. Choose the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. Meteorologists make estimations or guesses based on prior occurrences in _____ _____.

2. The weatherman believes that he can _____ an ***outcome*** based on what he already knows.

3. One type of weather data is _____.

4. Looking at data and then ***predicting*** an outcome is known in mathematics as _____.

5. The probability of something happening is sometimes referred to as _____.

6. An 80% chance of rain means that 80 times out of 100 in the past when the weather patterns were the same as today, _____ occurred.

7. _____, _____ and _____ are devices that use probability to effect an outcome.

8. These devices are good for games because the probability of a given outcome is never _____, only possible.

9. Probability has a _____ similar to other parts of mathematics.

Refer to Example Set 1 to answer questions 10-16.

10. The ***set*** containing all possible outcomes is called the _____.

11. The ***sample space*** here contains a total of _____ students.

12. The result of an ***experiment*** is called the _____.

13. A(n) _____ is a set whose members are members of an equal or larger set.

14. A(n) _____ is something that produces results that can be seen and recorded.

15. The outcome of each event is placed within _____.

16. Determine the outcomes if the "experiment" is all the students whose name begins with the letter, T. _____

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Refer to Example Set 2 to answer questions 17-19.

17. There are a total of _____ vehicles in the sample space.

18. The set that shows the ***event*** of all the red and black vehicles is { _____}.

19. The set that shows the event of all vehicles that are **NOT** red, blue or white is {_____}.

Determine the solutions to the probability questions 20-24. A list of data contains the numbers 1, 2, 3, 4, 5, 4, 4 and 6. Determine the following:

20. the sample space _____

(a) {1, 2, 3, 6} (c) {4, 5, 6}
(b) {4} (d) {1, 2, 3, 4, 5, 4, 4, 6}

21. the elements in the event of all the even numbers _____

(a) {2, 4, 6} (c) {2, 4}
(b) {2, 4, 4, 4, 6} (d) {1, 3, 5}

22. the elements in the event of all the numbers greater than 3 _____

(a) {1, 2} (c) {3, 4, 4, 4, 5, 6}
(b) {3, 4, 5, 4, 4, 6} (d) {4, 4, 4, 5, 6}

23. the elements in the event of all the numbers that appear only once _____

(a) {1, 2, 3, 5} (c) {1, 2, 3, 5, 6}
(b) {1, 3, 5, 6} (d) {4, 4, 4}

24. the elements in the event of all the numbers between zero and seven _____

(a) {0, 7} (c) {1, 2, 3, 4, 5}
(b) {6} (d) {1, 2, 3, 4, 4, 4, 5, 6}

Determine the solutions to the probability questions 25-29. The temperatures for one week in Death Valley were recorded as follows: 112°, 112°, 113°, 111°, 111°, 111° and 114°.

25. 110° is contained in the sample space. _____ (a) True or (b) False

26. the elements in the event of the temperature that occur the most _____

27. the elements in the event of the temperatures that occur only once _____

28. the elements in the event of the temperatures that occur at least once _____

29. the elements in the event of the temperatures that occur more than once _____

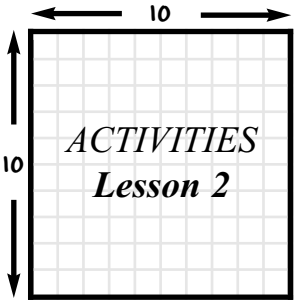
30. Write the **Life Principle**. "_____
_____."

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Predictions

Outcomes



You are making progress! ***Answer the following questions. Choose the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. Probability is the likelihood that a certain _____ will occur at the end of an experiment.

2. To ***interpret*** something is to tell what it _____.

3. Other words used to describe probability are _____ and ***percent***.

4. _____ represents the number of actual outcomes for every hundred outcomes that occur.

5. A 35% ***chance*** of rain means that it will rain _____% of the time under the current weather conditions.

6. The probability formula divides the number of favorable outcomes by the number of elements in the _____ set.

7. The sample set (space) is the set of all _____ outcomes.

8. The _____ of the probability formula is the number of possible outcomes.

9. A ratio of _____ outcomes to possible outcomes is set up to determine the probability of the event occurring.

Refer to Example Set 1 to answer questions 10-14.

10. The bag of marbles in the example contained _____ marbles.

11. The number of favorable outcomes for picking a red marble from the bag is _____, so this number is placed in the numerator.

12. The number of possible outcomes is _____, so this number is placed in the denominator.

13. The probability of pulling a red or green marble from the bag is _____ out of fifty.

14. The reduced fraction of the above answer tells you that there is a two out of _____ chance of pulling a red or green marble from the bag of marbles.

Refer to Example Set 2 to answer questions 15-17.

15. To solve this problem, calculate the total number of favorable outcomes for pulling a red or green marble from the bag by _____ the individual outcomes for red and green.
(a) adding (b) subtracting (c) multiplying (d) dividing

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16. The number of outcomes from question 15 is _____ the total number of possible outcomes. (a) added to (b) subtracted from (c) divided by

17. There is a _____ out of five chance of **NOT** pulling a red or green marble from the bag.

Calculate the following probabilities. Use the space provided to show your work and write your answers on the blanks.

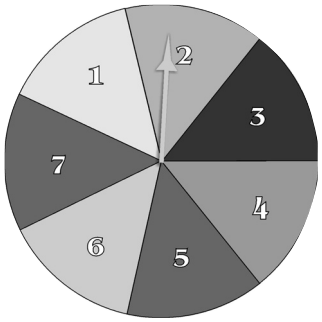
18. A bag of marbles contains 25 marbles. If 5 of the marbles are blue, calculate the probability of pulling a blue marble from the bag. Be sure to reduce your answer.

_____

19. Calculate the probability of pulling a marble that is not blue from the bag. _____

20. If all five blue marbles are pulled from the bag, the total number of new possibilities is _____.

Use the spinner below to answer questions 21-23.



21. Calculate the probability of the spinner stopping on an even number. _____

(a) $^3/_7$ (b) $^7/_3$ (c) 3 (d) $^4/_7$

22. Calculate the chance of the spinner stopping on a number greater than 6. _____

(a) 0 (b) 1 (c) $^1/_6$ (d) $^1/_7$

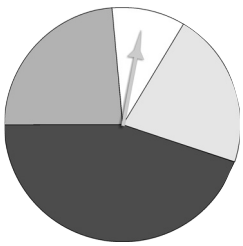
23. Calculate the chance of the spinner stopping on a number touching the seven. _____

(a) $^1/_7$ (b) $^2/_7$ (c) $^3/_7$ (d) $^4/_7$

24. Looking at the spinner below, the spinner has the greatest chance to stop on which color?

_____

(a) white (b) dark gray (c) black (d) gray



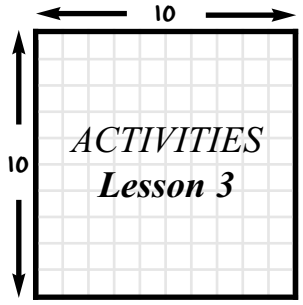
25. Write the **Life Principle**. "_____

_____."

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Predictions

Luck, or Not!

You are making progress! ***Answer the following questions. Choose the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. If there are no red marbles in the bag, the probability of drawing a red marble from the bag is _____.

2. Any fraction with a zero in the numerator has a value of _____.

3. 40 was placed in the denominator of the fraction because _____ red marbles were pulled from the bag.

4. Since no red marbles are in the bag, there cannot be an outcome; therefore, a zero is placed in the _____ of the probability formula.

5. The number of possible outcomes in the sample space is _____.

6. When the sample space does not contain the desired outcome, then the probability of obtaining that outcome is _____.

7. The probability of Professor K pulling a one-dollar bill from his pocket is _____.

8. The number of possible desired outcomes is ten, and that number is placed in the _____.

9. The number of ***elements*** in the sample space is also ten, and that number is placed in the _____.

10. When the numerator and denominator of a fraction are the same the value of the fraction is _____.

11. A probability of one ***translates*** into an outcome happening _____% of the time.

12. The probability that something will happen is called _____.

13. Telling what something *means* is to _____ it.

Refer to Example Set 1 to answer questions 14-16 for part a), 17-18 for part b), and 19 for part c).

14. The sample space contains _____ possible outcomes.

15. There is only _____ chance(s) to produce an outcome of the number five.

16. _____ out of 6 is the chance of the number cube landing with the 5 in the up position.

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17. There are _____ outcomes from the sample space that are not 5.

18. The probability of **NOT** rolling a five is _____.

19. The probability of rolling a seven is _____.

Refer to Example Set 2 to answer questions 20-25.

20. The number cube consists of _____ sides.

21. The number cube is labeled with _____.
(a) numbers (b) letters (c) various symbols

22. There are _____ elements in the sample space.

23. The probability of rolling a C is _____ out of 12.

24. The probability of rolling a G is _____ out of 12.

25. The probability of rolling a P is _____.

Refer to Example Set 3 to answer questions 26-28.

26. Which letter is most likely to appear on top? _____

27. Which letters have a probability of one? _____

28. Which is more likely to be the result of rolling the number cube? _____
(a) A (b) A, B (c) A, B, E (d) D

29. You can answer questions in probability if you take your _____ and think through them.

Work the following problems, show your work, and write the reduced answer on the blank.

30. Professor K asked Nikki, one of his students, to pull a marble from a bag containing 52 marbles. If the bag contains 13 blue marbles, calculate the probability of pulling a blue marble from the bag. _____

31. Determine the probability that Nikki pulls a marble that is **NOT** blue from the bag after two blue marbles have been taken from the bag. _____

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32. Professor K gave another student, Dustin, a ten-sided number cube. The cube was numbered with even numbers, 2, 4, 6, 8, 10, 12, 14, 16, 18, and 20. Determine the chance that Dustin will roll a number between and including 10-20 (10, 12, 14, 16, 18, 20). _____

(a) $^{2}/_{5}$ (b) $^{5}/_{10}$ (c) $^{3}/_{5}$ (d) $^{2}/_{6}$

33. Determine the possibility that Dustin will roll an odd number between 2 and 20.

_____

(a) 1 (b) $^{1}/_{2}$ (c) 0 (d) $^{1}/_{5}$ (e) $^{1}/_{6}$ (f) none of the above

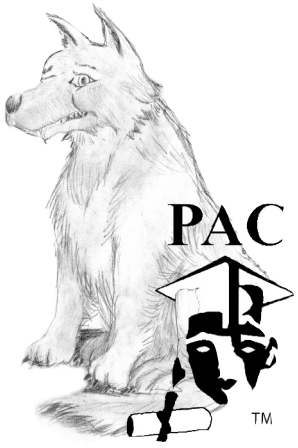
34. Determine the chance that Dustin will roll an even number less than six._____

(a) $^{1}/_{2}$ (b) $^{1}/_{5}$ (c) $^{6}/_{10}$ (d) $^{4}/_{5}$

35. Write the **Life Principle**. "_____

_____."

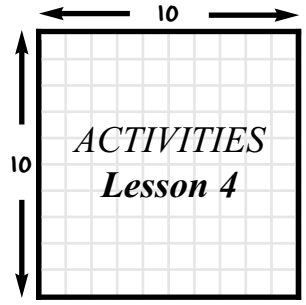
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Predictions

Solving Problems

You are making progress! ***Answer the following questions. Choose the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. Professor K believes many things in life are like _____.

2. Solving a problem includes determining or _____ an outcome.

3. Professor K sometimes begins to solve a problem by making a _____ as to what the problem is.

4. A(n) _____ is a theory.

5. Professor K works through the facts surrounding the ***conjecture*** to obtain a(n) _____.

6. _____ is one of the tools you can use to predict an outcome.

7. You can use graphs and observable _____ in number groups to make predictions.

8. A repeated occurrence is a(n) _____.

9. In *How to Solve It* you must first _____ the problem.

10. Next, you must _____ a plan.

11. Carrying out the _____ is the third major step.

12. Often, _____ a picture can help you to understand the problem.

13. As you carry out your plan, you should _____ each step.

Refer to Example Set 1 to answer questions 14-17.

14. Often you must _____ a problem to understand it.

15. In this problem, all the numbers are _____, odd counting numbers.

16. In the notation used to signify the value of a specific term in a series of numbers, _____ is the letter with a subscript.

17. _____ is the formula for determining the n^{th} term.

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18. The twelfth term would be _____.

19. Professor K followed the steps proposed by a man named _____.

Solve the following problems. Be sure to show all the steps to solving each problem.

20. Find the tenth term in this series of numbers: 2, 4, 6, 8, 10… _____

(a) 22 (b) 26 (c) 18 (d) 24 (e) none of these

21. Find the twentieth term in this series of numbers: 3, 6, 9, 12, 15, 18… _____

(a) 57 (b) 60 (c) 63 (d) 54 (e) none of these

22. Find the next term in this series of numbers: 4, 7, 10, 13, 16… _____

(a) 19 (b) 21 (c) 18 (d) 17 (e) none of these

23. The formula to find the n^{th} term for the series of numbers: 5, 10, 15, 20, 25… is _____.

(a) $n + 5$ (b) $5n$ (c) $2n + 5$ (d) $3n$ (e) none of these

24. The formula to find the n^{th} term for the series of numbers: 6, 11, 16, 21, 26… is _____.

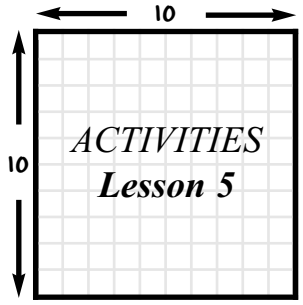
(a) $5n - 1$ (b) $5n + 1$ (c) $2n$ (d) $6n$ (e) none of these

25. Write the **Life Principle.** "_____ _____."

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Predictions

Predict with Graphs

You are making progress! ***Answer the following questions. Choose the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. ***Mutual fund*** managers watch the _____ and _____ markets.

2. Stock and ***commodity*** prices are listed daily in _____ and on the _____.

3. The wise manager looks at ***stock market*** reports and searches for _____.

4. After looking at market reports the fund manger _____ or sells ***stocks*** or commodities.

5. The quickest method that stock market ***analysts*** use to look for patterns is _____.

6. Stock price averages are shown on _____ graphs.

7. Most businesses and corporations use _____ and _____ graphs to show income and expenses as well as profits and losses.

8. Production and _____ are also usually shown with bar and pie graphs.

9. Stock market analysts make _____ as to the future of certain stocks or commodities.

10. Businesses and corporations use the pie and bar graphs to make predictions relating to production and _____.

11. Something used in trade is called a(n) _____.

12. A place where stocks are bought and sold is a(n) _____.

13. A(n) _____ is an overall inclination, direction or pattern of events.

Refer to Example Set 1 to answer questions 14-18.

14. The date of each day of the month is plotted along the _____.

15. The overall trend between the third and fifteenth was _____.

16. The trend between the fifteenth and twenty-first is _____.

17. The estimated price of natural gas on the twelfth is _____. ($2.22, $2.25, $2.15)

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18. The price of natural gas usually only moved _____ cents per day.

Refer to Example Set 2 to answer questions 19-22.

19. Column A represented the number of _____ pizzas sold.

20. The pizza parlor sold the fewest number of _____ pizzas.

21. Should the owner of the pizza parlor check his pepperoni supply. Yes _____ No _____

22. Professor K made the assumption that the lunch run each day was _____.
(a) different (b) similar (c) exactly the same

23. The more information that is available makes assumptions and predictions more _____. (a) accurate (b) inaccurate (c) confusing

Refer to Example Set 3 to answer questions 24-28.

24. Professor K changed the bar graph of Example Set 2 into a _____ graph.

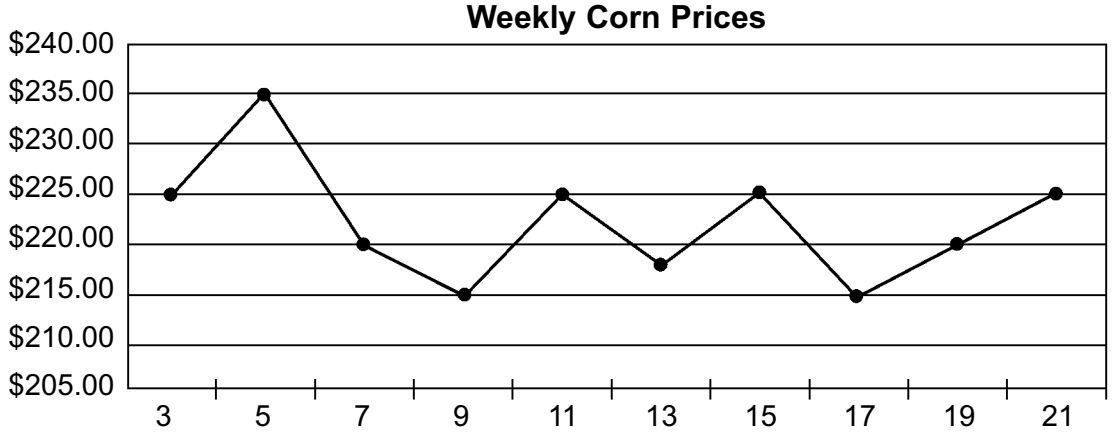
25. Professor K likes graphs because the data can be _____ more quickly.

26. _____ pizzas cover the largest area.

27. _____ pizzas cover the smallest area.

28. When looking at graphs, such as pie graphs, it is not necessary to know the _____ to determine which item is the largest or smallest.

Answer the questions related to each graph. Write the letter of the correct answer.

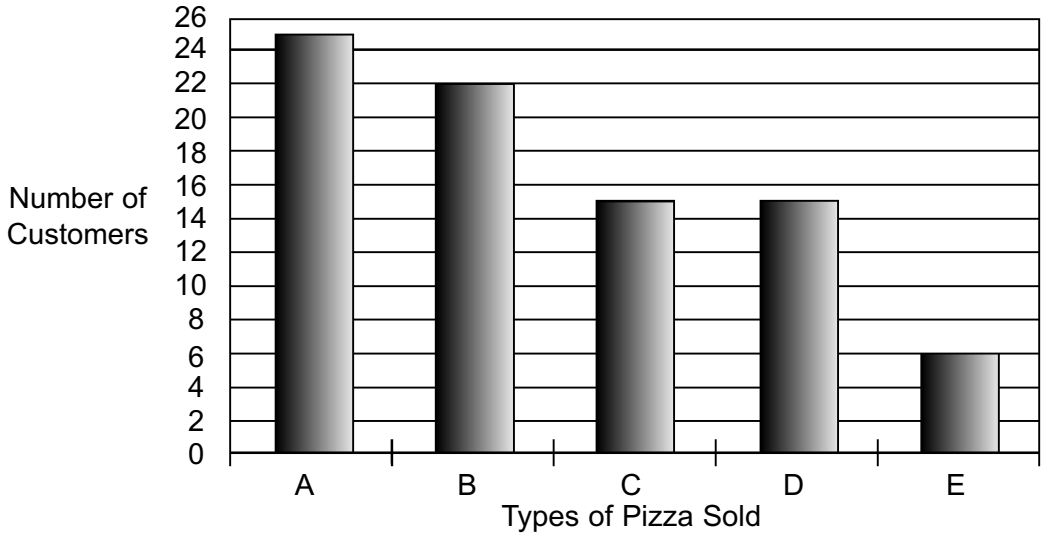


29. Choose the week of this 21 week span that ended with a corn price of $210.00. _____
(a) 6 (b) 17 (c) 13 (d) none of these

30. Choose the week of this 21 week span that ended with a corn price of $235.00. _____
(a) 6 (b) 21 (c) 5 (d) none of these

31. Choose the best answer for the overall trend of this 21 week span for corn prices. _____
(a) up (b) down (c) no overall trend

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32. Choose the overall trend of the above graph. _____

(a) up (b) down (c) no overall trend

33. Choose the best estimate for the value of category C. _____

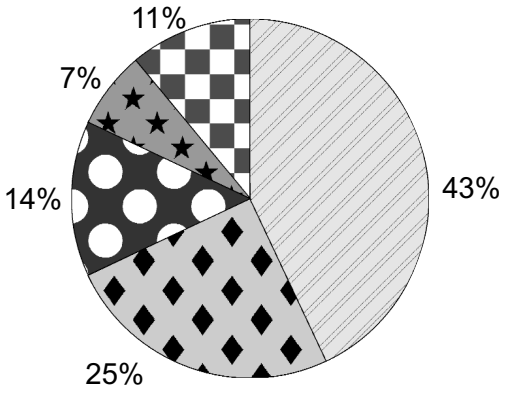
(a) 24 (b) 14 (c) 15 (d) 10 (e) 12

34. Choose the best answer concerning the graph above. _____

(a) number of students in a class (b) soft drink survey results (c) can't tell

Answer questions 35-39 using the pie chart below.

Expenses for the Ready Brick Company



35. If the Ready Brick Company spends most of its budget on labor, which pattern represents the labor expense? _____

(a) stars (b) circles (c) squares (d) diagonal lines

36. Insurance is the smallest portion of the company's expenses. What is the amount of money for every $100.00 spent for insurance? _____

(a) $3.00 (b) $10.00 (c) $7.00 (d) $11.00

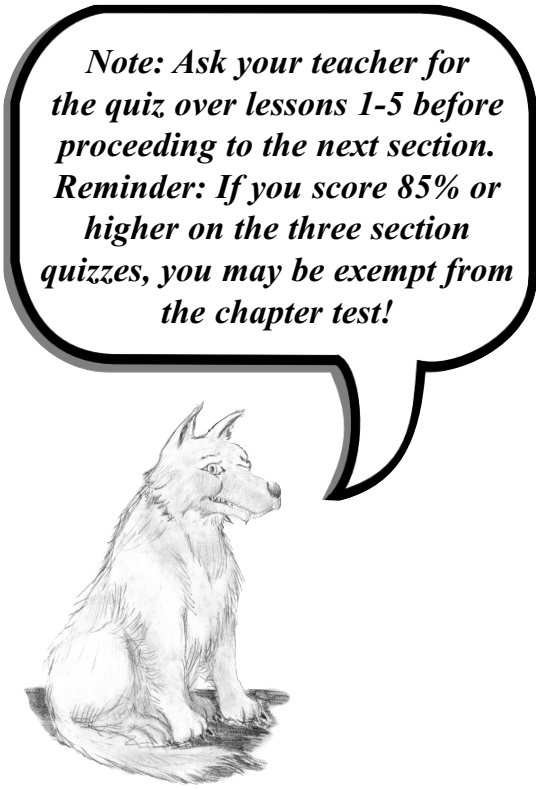
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37. If natural gas is the second to the largest expense for the company, which pattern represents the expenses for natural gas? _____
(a) diamonds (b) squares (c) stars (d) circles

38. The company spent twice as much for supplies as for another category. Which pattern represents the portion of the budget spent on supplies? _____
(a) circles (b) diagonal lines (c) stars (d) squares

39. Two categories represent exactly one-half the budget when added together. These two categories are represented by which patterns? _____
(a) stars and diamonds (c) diamonds and diagonal lines
(b) squares and circles (d) diagonal lines and stars

40. Write the **Life Principle.** "_____
_____."



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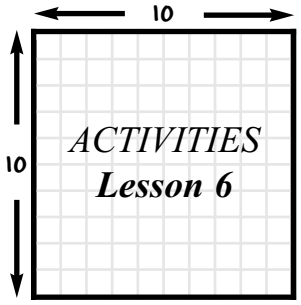
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Predictions

Similar Triangles



You are making progress! ***Answer the following questions. Choose the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. Many problems in life can be solved because they are _____ to problems you have encountered in the past.

2. Professor K often encounters problems similar to those of the _____.

3. Often, because similarities are used, solutions to problems can be obtained _____.

4. In mathematics _____ are used to find solutions to problems.

5. All triangles are ***similar*** in that they have _____ sides and _____ angles.

6. Two triangles are similar mathematically speaking if the ***corresponding*** angles of the triangles are _____.

7. When two triangles are similar the _____ of the corresponding sides are also equal.

8. Two triangles are similar _____ each of the corresponding angles are ***congruent*** and the ratios of corresponding sides are equal.

9. The symbol, ~ means _____.

10. The symbol, ≅ means _____.

11. If ∠A ≅ ∠D, ∠B ≅ ∠E, and ∠C ≅ ∠F then △ABC _____ △DEF.

12. If △ABC _____ △DEF, then $^{AB}/_{DE} = {}^{AC}/_{DF} = {}^{BC}/_{EF}$.

13. _____ means in the same respective location.

14. Having the same shape but not necessarily the same size is to be _____.

15. _____ means having the same measure.

Look at Example Set 1 to answer questions 16-20.

16. The task is to show two triangles are _____.

17. Intersecting lines form _____ angles.

18. The sum of the measures of the angles of a triangle equal _____.

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19. If m∠CEB = m∠CAD, then ∠CEB _____ ∠CAD.

20. △ACD ~ △BCE, because corresponding angles are _____ in the two triangles.

21. A mathematical property used to show that two triangles are similar is known as the _____ (A-A-A) property.

22. The A-A-A property gets its name from the fact that the three _____ of the triangles are congruent.

Refer to Example Set 2 to answer questions 23-24.

23. Professor K uses _____ to find the length of the missing side.

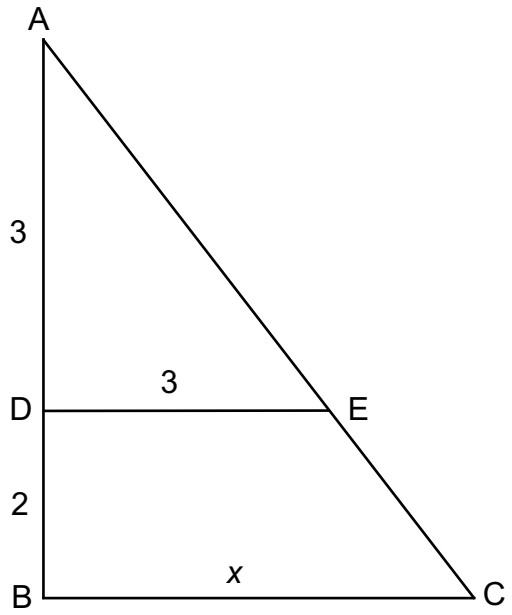
24. Once a ratio is set up, you can _____ multiply to obtain the equation needed to solve for *x*.

Refer to Example Set 3 to answer questions 25-26.

25. All the angles in △ACE and △BDE have the same measure, therefore, △ACE _____ △BDE.

26. The length of the line segment BD is _____ units.

Refer to the diagram below to answer questions 27-28.



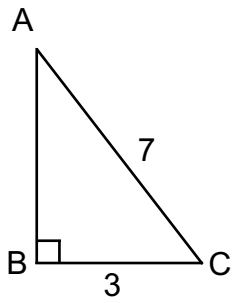
27. Calculate the length of the line segment BC. _____

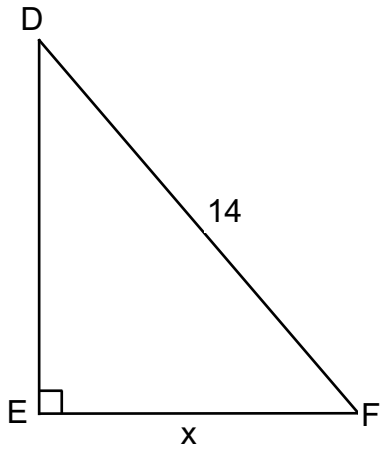
28. Circle the property that can be used to show △ABC ~ △ADE. _____

(a) distributive (b) associative (c) Professor K's (d) A-A-A

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Refer to the diagrams below to answer questions 29-30.

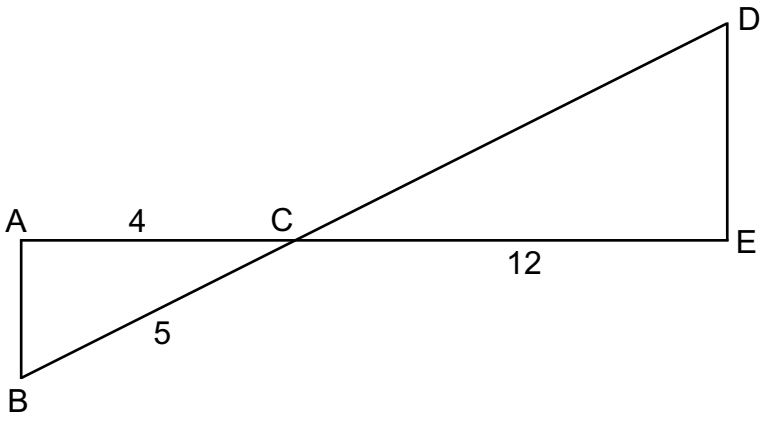




29. ∠B ≅ _____

(a) ∠A (b) ∠E (c) ∠F (d) ∠D

30. Calculate the length of line segment EF. _____



31. In the diagram above calculate the length of line segment CD. _____

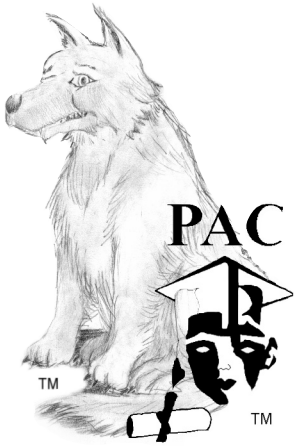
(a) 10 units (b) 12 units (c) 15 units (d) can't tell, not enough information

32. m∠ACB = m∠DCE because ∠ACB and ∠DCE are _____ angles.

(a) right (b) acute (c) obtuse (d) vertical (e) small

33. Write the **Life Principle.** "_____
_____."

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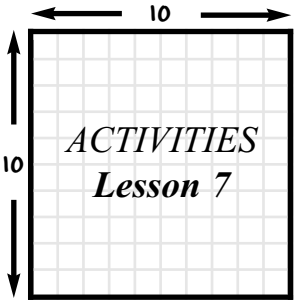


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Predictions

Ratios Predict



You are making progress! ***Answer the following questions. Choose the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. You can use ***similarities*** of objects to predict or determine a _____ measurement of the object in question.

2. Professor K could estimate the _____ of the tree in Michael's yard.

3. Professor K could determine this by the length of the _____ cast by the tree onto the ground.

4. Professor K and Michael used _____ tapes, paper and pencils and proceeded to determine the height of the tree.

Refer to Example Set 1 to answer questions 6-10.

5. Professor K is _____ feet tall.

6. Professor K's shadow was _____ feet long.

7. The shadow of the tree was _____ feet long.

8. Professor K then set up a _____ to determine the height of the tree in comparison to his own height.

9. Professor K cross-multiplied and then _____ to obtain the height of the tree.

10. The height of the tree was _____ feet.

Refer to Example Set 2 to answer questions 11-15.

11. Proportions are important to the enlargement of _____.

12. Corresponding dimensions must be placed in the _____ location in the ratios.

13. The correct proportion or ratio for this problem is: _____.
(a) $^5/_3 = {}^5/_x$ (b) $^3/_5 = {}^x/_5$ (c) $^3/_5 = {}^5/_x$ (d) none of these

14. After cross-multiplying, Professor K divided by _____ to obtain the answer.

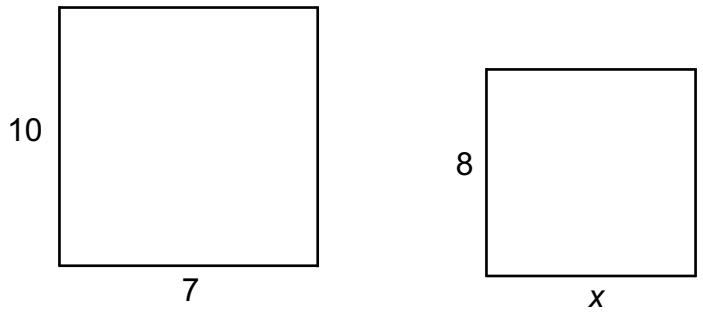
15. The length of the missing side was _____ inches.

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Calculate the value of the indicated sides of similar objects. Show your work in the space provided and write your answer on the blank.

16. A local school installed a new flagpole. The principal asked Professor K to determine how much lanyard (rope) would be needed to go through the pulleys at the top and bottom of the flagpole. The principal did not know the height of the flagpole. Professor K was six feet tall and he cast a shadow of 12 feet. At the same time, the flagpole cast a shadow of 40 feet. Calculate the length of rope needed so the flag can be raised and lowered. (Hint: Once you have determined the height of the pole multiply by two since the rope is doubled on flagpoles.) Draw a picture to help visualize the height of the flagpole. _____

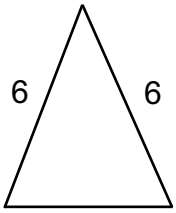
17. Calculate the indicated length. _____

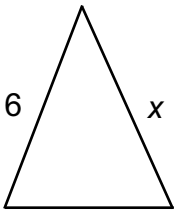


(a) 5.6 units (b) 10 units (c) 6 units (d) 5 units (e) none of these

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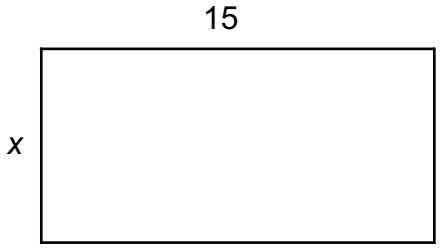
18. Calculate the length of the missing dimension. _____

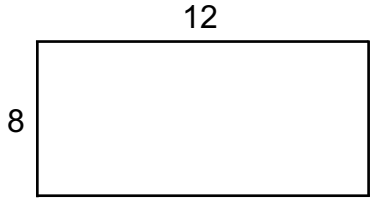




(a) 12 units (b) 1 unit (c) 9 units (d) 5 units (e) none of these

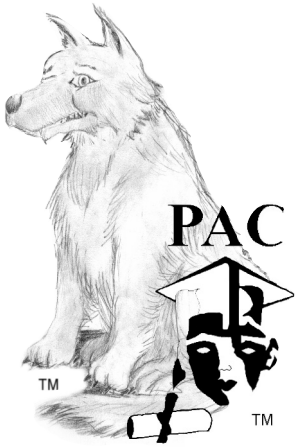
19. Calculate the value of *x*. _____





20. Write the **Life Principle.** "_____
_____."

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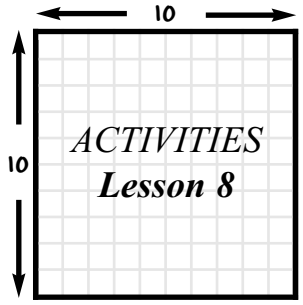


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Predictions

Predict Areas



You are making progress! ***Answer the following questions. Choose the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. Differences in area can be calculated by using the concept of _____.

2. _____ means to demonstrate.

3. Calculations are easier when you understand the concept of _____ objects.

4. To present a question is to _____ a question.

Refer to Example Set 1 to answer questions 5-8.

5. Professor K used his knowledge about finding the _____ of shapes to help him determine the dimensions of the various sheets of wrapping paper.

6. The formula for the area of a rectangle is _____.

7. Professor K discarded some of his calculations because he determined them to be _____.

8. Mrs. K thought that her husband should have used _____ to find the dimensions more quickly.

Look at Example Set 2 to answer questions 9-10.

9. Mrs. K compared the lengths of one side of the rectangle using a comparison of the areas in a _____.

10. When comparing the areas and lengths in this example, only the dimension of _____ side changed.

Use the concept of similarity to determine or predict the indicated value. Show your work in the space provided.

11. The area of a rectangle is 25 square meters. If the length of one side is doubled, determine the area of the new rectangle. _____

(a) 12 sq meters (b) 75 sq meters (c) 50 sq meters (d) 40 sq meters

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Remember the formula for the area of a triangle is $A = \frac{1}{2}bh$. A proportion can be set up comparing the area of the two triangles with the heights (altitudes).

12. The area of a triangle is twice that of another triangle. Calculate the height of the second triangle if the base of the first triangle is 10 inches and the area of the first triangle is 50 square inches. The bases of the two triangles are of equal length. _____

(a) 20 inches (b) 6 inches (c) 8 inches (d) 2 inches

13. The area of a rectangle is one-fourth that of another rectangle. Two sides of the first rectangle are equal to two sides of the second. Determine the length of the other two sides of the first rectangle if the remaining sides of the second rectangle are 4 inches in length. _____

14. Write the **Life Principle.** "_____ _____."

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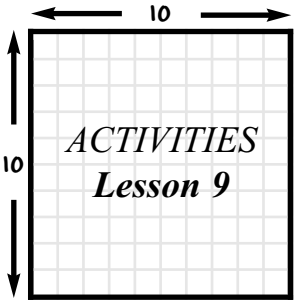
Name: _____

Date: _____ Grade: _____



Predictions

Ratios and Rectangles



You are making progress! ***Answer the following questions. Choose the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. Changing just one side of a rectangle affects the area by the exact same _____.

2. When both sides of a rectangle are changed the area changes more _____ than if only one side were changed.

Look at the graph, "Area of a Square," to answer questions 3-12.

3. The area of a square of side two inches is _____.

4. The area of a square of side four inches is _____.

5. Choose the best estimate for the area of a square of side three and one-half inches. _____
(a) 16 (b) 9 (c) 14 (d) 12

6. Choose the best estimate for the area of a square of side one and one-half inches. _____
(a) 2 (b) 2.2 (c) 4 (d) 1

7. The graph is best described as a _____ graph.
(a) bar (b) pie (c) curved line (d) straight line

8. The numbers on the left side of the graph represent: _____.
(a) length (b) width (c) exponents (d) area

9. The area changes by a(n) _____ of two.

10. When length of the side of a square is doubled, the area increases by _____.

11. A(n) _____ is one of the numbers that are multiplied together in a multiplication problem.

12. To make something twice as large is to _____ it.

Refer to Example Set 1 to answer questions 13-16.

13. The first square is _____ inches on a side.

14. The area of the first square is _____ square inches.

15. The length of the side of the second square is _____.

16. The area of the second square is _____ times larger than the area of the first square.

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Refer to Example Set 2 to answer questions 17-20.

17. Professor K used _____ to calculate the area of the second square.

18. Professor K set up a proportion comparing the _____ of the areas to the ratios of the sides.

19. In the acronym, PEMDAS the "E" means _____.

20. The area of the second square is _____ square inches.

21. Professor K _____ his calculation of area by actually calculating the area of the second square using the length of the side.

22. You must _____ the ratio that determines the enlargement or reduction in an area problem when the length of both sides change.

23. If the sides change by a factor of three then the areas change by a factor of _____.

24. If the length of a side changes by a factor of 4, then the area changes by a factor of _____.

Refer to Example Set 3 to answer questions 25-26.

25. The first square is one-_____ the area of the other square.

26. If $x^2 = 1$, and x represents the length of the side of a square, then x = _____.

Work the following problems. Show your work in the space provided. Write your answer on the blank. Remember to draw a picture when necessary for you to visualize the problem.

27. A square with dimensions of 2 cm has an area of 4 sq cm. Using ratios, calculate the area of a square with dimensions 4 cm. _____

28. A square of area 6.25 sq meters is compared to a square of area of 25 sq meters. Calculate the length of the side of the second square, if the length of the side of the first is 2.5 meters. Choose the best answer. _____

(a) 4 (b) 5 (c) 4.5 (d) 6

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29. The area of one square is 25. Calculate the length of the side of a square whose area is four times larger. _____

30. The area of a square is 4 square inches. Calculate the area of a square whose dimensions are one inch longer than that of the first. _____

31. Write the **Life Principle.** "_____ _____."

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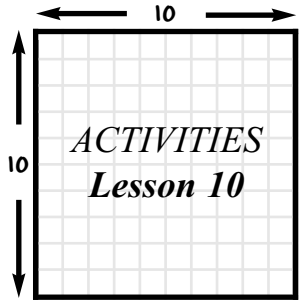


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Predictions

Ratios Speak Volumes



You are making progress! ***Answer the following questions. Choose the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. Differences in volume can be calculated by using the concept of _____.

2. Volume is shown in _____ units.

3. If an object is a cube, you simply _____ one edge, or raise it to a power of three.

4. A cube with an edge of length 2 in. has a volume of _____ ***cubic*** inches.

5. The units and values of volumes are all _____ in nature.

6. When making calculations of the volume of similar shapes, the desired ratio is cubed or raised to the power of _____.

7. _____ means referring to the shape of a cube.

Refer to Example Set 2 to answer questions 8-12.

8. The dimensions of cube A are _____ the dimensions of cube B.

9. The ***factor of reduction*** of the length is _____.

10. The factor of reduction in #9 is raised to a power of _____ to calculate the factor of reduction of the volume.

11. The factor used to reduce the size of something is called the _____ _____.

12. A cube with an edge of length 4 inches has a volume of _____ cubic inches.

Refer to Example Set 3 to answer questions 13-17.

13. The length of the edge of the first cube was _____.

14. _____ means three times.

15. The ***factor of enlargement*** of the volume is _____ in this example.

16. The factor used to enlarge something is called the _____.

17. The volume of the second cube is _____.

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Work the following problems using ratios of volumes and dimensions in the space provided. Write your answer on the blank. Remember to draw a picture when necessary to help visualize the problem.

18. Determine the factor of enlargement of the volume if the dimensions of a cube are 5 times greater than the dimensions of another cube. _____

19. The volume of cube A is one cubic unit. Calculate the dimensions of cube B, if the volume of cube B is eight cubic units. (Hint: You must first determine the length of the edge of cube A.) _____

(a) 1 cubic unit (b) 2 cubic units (c) 3 cubic units (d) 4 cubic units

20. A cube with an edge length of five inches contains a volume of 125 cubic inches. The dimensions of another cube are one-fifth that of the first cube. Calculate the volume of the second cube. _____

(a) 1 cubic inch (b) 2 cubic inches (c) 3 cubic inches (d) 4 cubic inches

21. The volume of a cube is 216 cubic cm. The length of an edge of this cube is twice the length of the edge of another. Calculate the volume of the second cube. _____ cm

22. Write the **Life Principle.** "_____ _____."

Note: Ask your teacher for the quiz over lessons 6-10 before proceeding to the next section. Reminder: If you score 85% or higher on the three section quizzes, you may be exempt from the chapter test!

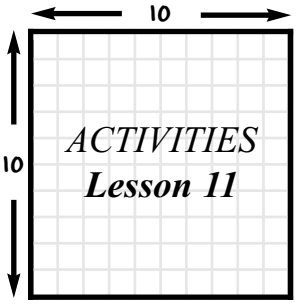


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Predictions

Pattern Problems



You are making progress! ***Answer the following questions. Choose the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. Professor K enjoyed testing his children's _____ abilities.

2. Professor K used _____ as a basis for determining a pattern.

Refer to Example Set 1 to answer questions 3-6.

3. The faces of a solid shape that are not covered or visible are called _____ faces.

4. Step 1 shows what the _____ problem looked like.

5. _____ faces were exposed in the first sugar cube.

6. A cube has _____ faces.

7. The number of items necessary to cover all the exposed surfaces of an object is called a _____.

Refer to Example Set 2 to answer questions 8-10.

8. This example begins with _____ cubes in the corner of the box.

9. There was a total of _____ exposed faces.

10. _____ sugar cubes were required to fill the second layer.

Refer to Example Set 3 to answer questions 12-17.

11. All the triangles shown are _____ to each other.

12. The _____ triangle has three sides.

13. The number of triangles in the first layer is _____.

14. The number of triangles in the second layer is _____.

15. The number of triangles it will take to cover the exposed sides of the second layer is _____.

16. After the triangles making up the first layer are placed properly around the initial layer one larger triangle can be seen. The number of exposed faces of the smaller triangles making this new triangle is _____.

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17. Sitting on Professor K's desk is a paperweight in the shape of a square pyramid. The number of exposed surfaces is _____. (Hint: Draw a picture of a square pyramid to help you visualize the problem.)
(a) 2 (b) 3 (c) 4 (d) 5

18. A bar of gold was sitting in the middle of a shelf and back against the wall at the U.S. Treasury in Fort Knox, Kentucky. How many bars of gold can be stacked around it to cover all the exposed faces of the bar of gold? _____
(a) 2 (b) 3 (c) 4 (d) 5

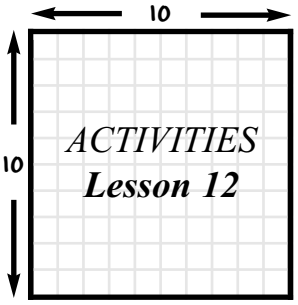
19. Write the **Life Principle.** "_____
_____."

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Predictions

Pattern Problems, Too



You are making progress! ***Answer the following questions. Choose the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. A(n) _____ calculates the number of sugar cubes in each new layer.

2. Predictions using a model or _____ are made from data obtained previously.

3. A(n) _____ is made to what the solution will be.

4. To make a(n) _____ is to reach a conclusion by guesswork.

5. It is good to _____ your ***conjecture*** or mathematical model.

6. Solutions are obtained by thinking through problems and then _____ them.

7. The first column in Table 12.1 is a list of the _____ numbers.

8. The second column in Table 12.1 is a list of the number of _____ per layer.

9. The last column in Table 12.1 is a list of the total _____ of cubes used altogether.

10. Table 12.1 is a record of the _____ from the problem involving the sugar cubes.

11. By making a list of the numbers it is easier to see the _____ that the problem is following to obtain the number of cubes in each _____.

12. The list of numbers in the second column is _____, _____, _____, and _____.

13. You must determine a(n) _____ that would obtain the next number in the list.

14. The challenge is to put your reasoning into a(n) _____ formula.

15. A(n) _____ is used to represent the number of the term.

16. The letter, _____, is normally the letter used to represent the number of the term.

17. A workable formula is usually obtained by using a _____ system.

18. The _____ of the letter *n* must be specified.

Refer to Example Set 1 to answer questions 19-28.

19. *n* was assigned the values 0, 1, ____, _____, 4, 5, ….

20. The first formula attempted was _____.

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21. Another formula was _____.

22. To _____ something means to deduce it.

23. $n(n + 1)$ is a formula that works. _____ (a) True or (b) False

24. The first values of n included zero. _____ (a) True or (b) False

25. The formula was revised by dividing by _____.

26. The new formula is _____.

27. The formula was then _____ to see if it would return the correct value for each term.

28. If the value of the _____ term is 5,050, then the value of the 90th term is _____.

Refer to Example Set 2 to answer questions 29-32.

29. A paper towel roll is in the shape of a(n) _____.

30. Each layer contained _____ rolls.

31. The formula for the number of rolls in each layer is _____.

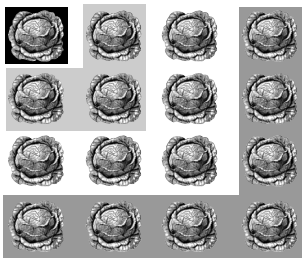
32. The formula for the number of total rolls is _____.

33. Professor K placed a box in the center of the floor of his storage building. Determine a formula for the number of boxes for each layer that he could stack only on the floor around the box. _____

(a) $n + 4$ (b) $3n + 1$ (c) $4n$ (d) $5 - n$

34. Determine how many cabbages are in Professor K's cabbage patch if Professor K wants six rows. The first four rows are shown below. Determine a formula for the number of cabbages in a layer (gray, white, dark gray), then add the number of cabbages in each layer plus the initial cabbage to obtain the total number of cabbages.

_____



(a) $2n - 1$ (b) 24 cabbages (c) 25 cabbages (d) 36 cabbages

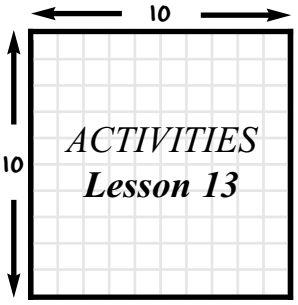
35. Write the **Life Principle.** "_____
_____."

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Predictions

Multiple Predictions



You are making progress! ***Answer the following questions. Choose the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. Sometimes the probability of a(n) _____ occurring more than once is desired.

2. Scientists want to know the _____ of an outcome of an experiment happening again.

3. This lesson demonstrates how to determine _____ probabilities.

Refer to Example Set 1 to answer questions 4-10.

4. The sample space of marbles contained _____ elements.

5. The chance that the first marble picked being red is one out of _____.

6. The red marble was returned to the cup. _____ (a) True or (b) False

7. The chance of Matthew picking the red marble two times is one out of _____.

8. If Matthew were to continue to repeat the experiment, the total probability would be calculated by continuing to multiply by the _____ of the probability of the next outcome.

9. Calculate the probability that on a third attempt, Matthew pulls a white marble from the cup. _____

10. Determine the probability that Matthew pulled the marbles red, red and white from the cup, if the marbles were returned to the cup each time. _____

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Refer to Example Set 2 to answer questions 11-16.

11. In this example, the green marble is **NOT** returned to the cup. _____
(a) True or (b) False

12. Matthew did **NOT** return the _____ marble back into the cup.

13. The probability of pulling a black marble on the third attempt as shown is _____.

14. P(green, blue, black) = _____.

15. Matthew put all the marbles back into the cup. After pulling a marble from the cup, he does **NOT** return it to the cup. Calculate P(red, green, green, green). Choose the best answer. _____
(a) $1/16$ (b) $1/8$ (c) 0 (d) 1

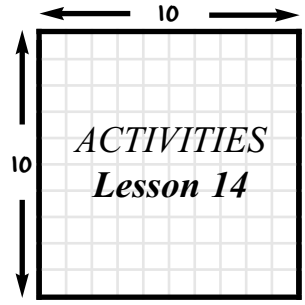
16. Calculate P(white, green, red) if after each attempt Matthew does **NOT** return any of the marbles to the cup. _____
(a) $1/84$ (b) $1/128$ (c) $1/64$ (d) 1

17. Write the **Life Principle.** "_____
_____."

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Name: _____

Date: _____ Grade: _____





Predictions

What are the Odds?

You are making progress! ***Answer the following questions. Choose the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. ***Odds*** are calculated in the same manner as chance or probabilities. _____
(a) True or (b) False

2. The chance that something will happen compared to chance that something else will happen is called the _____ of something happening.

3. Odds in favor, divides the number of _____ outcomes by the number of unfavorable outcomes.

4. Odds against, divides the number of unfavorable outcomes by the number of _____ outcomes.

Refer to Example Set 1 to answer questions 5-9.

5. The probability of pulling an even numbered cube is _____.

6. The probability of not pulling an even numbered cube is _____.

7. The odds of drawing an even numbered cube are _____.

8. Calculate the odds of pulling a cube numbered, 9. _____

9. Calculate the odds of pulling any of the numbers from 1-10. _____

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Refer to Example Set 2 to answer questions 10-12.

10. Professor K uses the formula for the odds _____ to calculate the odds of **NOT** pulling a cube numbered 10, 20, 30 or 40.

11. Calculate the odds of **NOT** pulling a cube numbered with a multiple of 5. (5, 10, 15, 20, 25, …) _____

12. Calculate the odds of drawing a numbered cube greater than 2, or the odds on **NOT** drawing a 1 or 2. _____

Refer to Example Set 3 to answer questions 13-16.

13. The odds in favor of rolling a number less than six is determined by _____ P(1, 2, 3, 4, 5) by P(6).

14. The odds of rolling a number less than 6 are _____ to 1.

15. Calculate the odds of rolling 1, 2, or 3 on a number cube like the cube in Example Set 3. _____

16. Calculate the odds of rolling a number greater than 3 on the number cube. _____

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17. A number cube of eight sides is specially labeled with the numbers 2, 2, 2, 3, 3, 3, 4, 4. Calculate the odds of rolling a 2. _____

(a) $^{5}/_{3}$ (b) $^{3}/_{5}$ (c) $^{3}/_{8}$ (d) $^{2}/_{8}$ or $^{1}/_{4}$

18. Using the cube in #17, calculate the odds of **NOT** rolling a 4. _____

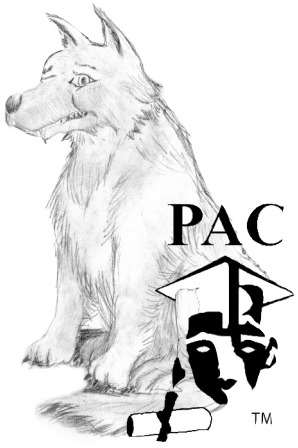
(a) $^{2}/_{3}$ (b) $^{3}/_{5}$ (c) $^{3}/_{1}$ (d) $^{2}/_{8}$ or $^{1}/_{4}$

19. Using the cube in #17, calculate the odds of rolling a 2 or 4. _____

(a) $^{3}/_{5}$ (b) $^{2}/_{5}$ (c) $^{1}/_{4}$ (d) $^{5}/_{3}$

20. Write the **Life Principle.** "_____
_____."

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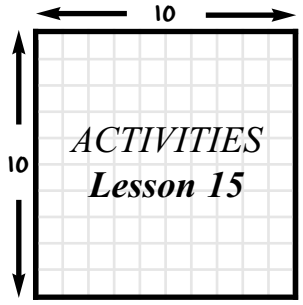
Name: _____

Date: _____ Grade: _____



Predictions

Encryption



You are making progress! ***Answer the following questions. Choose the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. Numbers, letters or words with hidden meanings are written in _____.

2. Many ancient civilizations had hidden ***codes*** or meanings in their _____.

3. The writings of the Egyptians (_____), Babylonians (_____), and Hebrews show that they knew many of the _____ principles that we use today.

4. The Egyptians estimated the value of π (pi) to at least _____ decimals.

5. The Egyptians knew a great deal about the volume of pyramids. _____
(a) True or (b) False

6. The Babylonians' mathematics was very _____ for their time.

7. The Babylonians plotted positions of the _____.

8. The Babylonians knew of the mathematical theorem for triangles known today as the _____.

9. The Hebrews and Greeks used letters to represent _____.

10. The _____ also used letters to represent numbers.

11. Roman numerals are still used in special places such as memorials and _____.

12. The Hebrews and Greeks used their _____ alphabet to represent numbers.

13. The Romans used only _____ letters to represent numbers.

14. _____ is a term used to refer to numbers.

Use Table 15.1 to fill in the blanks.

15. L = _____ **16.** I = _____ **17.** D = _____ **18.** V = _____

19. C = _____ **20.** X = _____

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Refer to Example Set 1 to answer questions 21-26. You may use the space beside each problem if needed to make your calculations.

21. VI = _____

22. IX = _____

23. DCC = _____

24. CDX = _____

25. DCCCLXXXVII = _____

26. CDXLVIII = _____

27. To read a code you must _____ it.

28. Hidden within ancient writings are _____ facts.

29. In the Hebrew writings words had a numerical _____.

30. The numerical value of a word is determined by _____ the numerical value of each letter.

31. Solomon's builders knew the value of _____.

32. Important personal information, such as bank account data, is _____ as it passes over the Internet.

33. _____ means coded.

34. A(n) _____ is a hidden message within a group of letters, words or numbers.

Refer to Example Set 2 to answer questions 35-38.

35. Each number written on the paper represented a _____.

36. The zeros represented where to _____ words.

37. To spell, surprise, correctly the number code should have read
19 21 _____ 16 18 9 _____ 5

38. By using the same code as Professor K's children, decipher the following.
7 15 4 0 2 12 5 19 19 0 1 13 5 18 9 3 1

___ ___ ___ ____ ____ ____ ____ ____ ___ ___ ___ ___ ___ ___ ___

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39. During World War II, a group of Native American _____ were of great service to the United States as "code-talkers" so the Japanese could not intercept and translate military messages.
(a) Apache Indians (b) Comanche Indians (c) Navajo Indians (d) teenage boys

40. Help Professor K finish filling in the coded message to determine how much money his son wanted. Professor K has a son in college. His son sent a letter home with this message written in it.

SE.ND

MO.RE

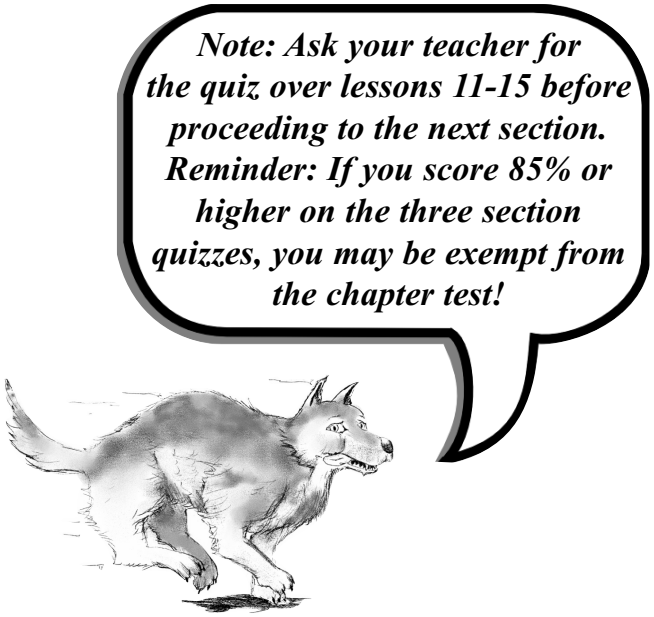
MON.EY

(a) 45.___7

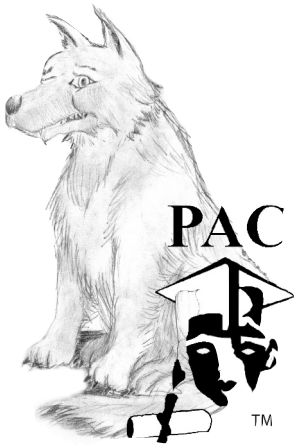
(b) 10.8___

(c) ___ ___ 6.___2

41. Write the **Life Principle.** "_____ _____."



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Intermediate Math Skills

Mathematics Charts

LENGTH - ENGLISH SYSTEM

12 inches	=	1 foot
3 feet	=	1 yard
5.5 yards	=	1 rod
320 rods	=	1 mile
1,760 yards	=	1 mile
5,280 feet	=	1 mile

VOLUME - ENGLISH SYSTEM

1 tablespoon, Tbsp, T	=	3 teaspoons, tsp
1 cup, c	=	16 tablespoons, Tbsp, T
1 pint, pt	=	2 cups, c
1 quart, qt	=	2 pints, pts
1 gallon, gal	=	4 quarts, qts

WEIGHT - ENGLISH SYSTEM

1 pound, lb	=	16 ounces, oz
1 hundredweight, cwt	=	100 pounds, lbs
1 ton	=	20 hundredweight, cwt
1 ton	=	2000 pounds, lbs

LENGTH - METRIC SYSTEM

1 meter	=	1,000 millimeters
1 meter	=	100 centimeters
1 kilometer	=	1,000 meters
1 centimeter	=	10 millimeters

VOLUME - METRIC SYSTEM

1 liter	=	1,000 milliliters
1 liter	=	100 centiliters
1 kiloliter	=	1,000 liters
1 centiliter	=	10 milliliters

WEIGHT - METRIC SYSTEM

1 gram	=	1,000 milligrams
1 gram	=	100 centigrams
1 kilogram	=	1,000 grams
1 centigram	=	10 milligrams

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PERFECT SQUARES

$\sqrt{1}=1$	$\sqrt{25}=5$	$\sqrt{81}=9$	$\sqrt{169}=13$
$\sqrt{4}=2$	$\sqrt{36}=6$	$\sqrt{100}=10$	$\sqrt{196}=14$
$\sqrt{9}=3$	$\sqrt{49}=7$	$\sqrt{121}=11$	$\sqrt{225}=15$
$\sqrt{16}=4$	$\sqrt{64}=8$	$\sqrt{144}=12$	$\sqrt{256}=16$

PERFECT CUBES

$\sqrt[3]{1}=1$	$\sqrt[3]{-8}=-2$	$\sqrt[3]{64}=4$	$\sqrt[3]{-125}=-5$
$\sqrt[3]{-1}=-1$	$\sqrt[3]{27}=3$	$\sqrt[3]{-64}=-4$	$\sqrt[3]{216}=6$
$\sqrt[3]{8}=2$	$\sqrt[3]{-27}=-3$	$\sqrt[3]{125}=5$	$\sqrt[3]{-216}=-6$

$$P = \frac{\text{the number of elements in the set containing favorable outcomes}}{\text{the number of elements in the sample set}}$$

$$Midpoint = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

FORMULAS

Surface Area	Area	Volume	Perimeter/ Circumference	Others
Sphere: $A_s = 4\pi r^2$	**Triangle:** $A = {}^1\!/_2 bh$	**Sphere:** $V = {}^4\!/_3 \pi r^3$	**Perimeter of a Rectangle:** $P = 2w + 2l$	**Pythagorean Theorem:** $c^2 = a^2 + b^2$
Cylinder: $A_s = 2\pi rh + 2\pi r^2$	**Rectangle:** $A = l \times w$	**Cone:** $V = {}^1\!/_3 \pi r^2 h$	**Circumference of a Circle:** $C = 2\pi r$ or $C = \pi d$	**Convert to Fahrenheit:** $F = {}^9\!/_5 C + 32$
Cube: $A_s = 6s^2$	**Circle:** $A = \pi r^2$	**Rectangular Prism:** $V = l \times w \times h$		**Convert to Celsius:** $C = {}^5\!/_9 (F - 32)$
Lateral Surface Area of a Cone: $A_{ls} = \pi rl$	**Trapezoid:** $A = {}^1\!/_2 (b_1 + b_2)h$	**Square Pyramid:** $V = ({}^1\!/_3) lwh$		**Distance:** $d = r \bullet t$
		Triangular Prism: $V = {}^1\!/_2 bhl$		**Slope:** $y = mx = b$
		Cylinder: $V = \pi r^2 h$		**Simple Interest:** $I = prt$

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TIME CONVERSIONS

1 week = 7 days
1 year = 12 months

CONVERSIONS

English to Metric	
1 ounce (oz)	28.35 grams (g)
1 pound (lb)	454 grams (g)
1 ton (T)	907.2 kilograms (kg)

Metric to English	
1 gram (g)	.035 ounce (oz)
1 kilogram (kg)	2.2 pounds (lb)
1 metric ton (mt)	2200 pounds (lb)

English to Metric	
1 cubic inch	16.39 cubic cm
1 gallon	3.785 liters
1 cubic foot	28.316 liters
1 quart	.946 liters

Metric to English	
1 cubic cm	.061 cubic inch
1 cubic meter	35.315 cubic feet
1 liter	1.05 quarts
1 liter	.264 gallon

English to Metric	
1 inch	2.54 cm
1 foot	0.3048 meter
1 yard	0.9144 meter
1 mile	1.6 km

Metric to English	
1 centimeter	0.3937 in.
1 meter	39.37 in.
1 meter	1.09 yds
1 kilometer	0.6213 mile

AREA CONVERSIONS

1 square centimeter = 0.155000 sq in.
1 square meter = 10.763910 sq ft
1 square inch = 645.16 sq mm
1 square foot = 0.09290304 sq meter
1 square yard = 0.836127 sq meter
1 square foot = 144 sq in.

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