

Estimation and Sequences

1. Describe the following sequence in mathematical terms. 144, 72, 36, 18, 9

- A. Descending arithmetic sequence
- B. Ascending arithmetic sequence
- C. Descending geometric sequence
- D. Ascending geometric sequence
- E. Miscellaneous sequence

2. Which of the following is not a whole number followed by its square?

- A. 1, 1
- B. 6, 36
- C. 8, 64
- D. 10, 100
- E. 11, 144

3. A nurse has to record her temperatures in Celsius but her thermometer reads Fahrenheit. A patient's temperature is 100.7° F. What is the temperature in $^{\circ}$ C?

- A. 32° C
- B. 36.5° C
- C. 38.2° C
- D. 213.3° C
- E. 223.7° C

4. Art realized that he had 2 more quarters than he had originally thought in his pocket. If all of the change in his pocket is quarters and it totals to \$8.75, how many quarters did he originally think were in his pocket?

- A. 27
- B. 29
- C. 31
- D. 33
- E. 35

5. There are 12 more apples than oranges in a basket of 36 apples and oranges. How many apples are in the basket?

- A. 12
- B. 15
- C. 24
- D. 28
- E. 36

6. Which of the following correctly identifies 4 consecutive odd integers where the sum of the middle two integers is equal to 24?

- A. 5, 7, 9, 11
- B. 7, 9, 11, 13
- C. 9, 11, 13, 15
- D. 11, 13, 15, 17
- E. 13, 15, 17, 19

7. What is the next number in the sequence? 6, 12, 24, 48, ____

- A. 72
- B. 96
- C. 108
- D. 112
- E. 124

8. Which of the following numbers could be described in the following way: an integer that is a natural, rational and whole number?

- A. 0
- B. 1
- C. 2.33
- D. -3
- E. none of the above

9. What is the next number in the following pattern? 1, 1/2, 1/4, 1/8, ____

- A. 1/10
- B. 1/12
- C. 1/14
- D. 1/15
- E. 1/16

10. Of the following units, which would be most likely to measure the amount of sugar needed in a recipe for 2 dozen cookies

- A. degrees Celsius
- B. milliliters
- C. quarts
- D. kilograms
- E. cups

Exponents

1. 10^4 is not equal to which of the following?

- A. 100,000
- B. 0.1×10^5
- C. $10 \times 10 \times 10 \times 10$
- D. $10^2 \times 10^2$
- E. 10,000

2. Multiply 10^4 by 10^2

- A. 10^8
- B. 10^2
- C. 10^6
- D. 10^{-2}
- E. 10^3

3. Divide x^5 by x^2

- A. x^7
- B. x^4
- C. x^{10}
- D. x^3
- E. $x^{2.5}$

4. Find 8.23×10^9

- A. 0.000000000823
- B. 0.0000000823
- C. 8.23
- D. 8230000000
- E. 8230000000000

5. 83,000 equals:

- A. 83.0×10^4
- B. 8.3×10^4
- C. 8.3×10^3
- D. 83.0×10^5
- E. 83.0×10^2

6. .00875 equals:

- A. 8.75×10^{-2}
- B. 8.75×10^{-3}
- C. 8.75×10^{-4}
- D. 87.5×10^{-3}
- E. 875×10^{-4}

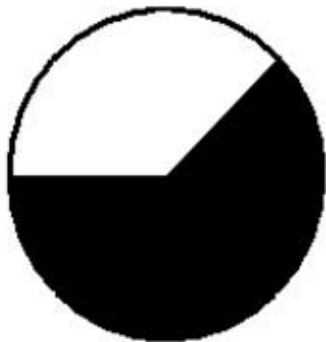
Fractions and Square Roots

1. What is the improper fraction or mixed number represented by the following figure?



- A. $2 \frac{1}{3}$
- B. $\frac{7}{6}$
- C. $2 \frac{5}{8}$
- D. $\frac{11}{3}$
- E. $\frac{11}{9}$

2. Which of the following fractions most correctly depicts the shaded area of the circle below?



- A. $\frac{3}{8}$
- B. $\frac{5}{8}$
- C. $\frac{3}{4}$
- D. $\frac{5}{11}$
- E. $\frac{1}{2}$

3. Which of the following is not a fraction equivalent to $\frac{3}{4}$?

- A. $\frac{6}{8}$
- B. $\frac{9}{12}$
- C. $\frac{12}{18}$
- D. $\frac{21}{28}$
- E. $\frac{27}{36}$

4. Solve: $0.25 + 0.65$

- A. $\frac{1}{2}$
- B. $\frac{9}{10}$
- C. $\frac{4}{7}$
- D. $\frac{2}{9}$
- E. $\frac{5}{16}$

5. Which of the following statements is false?

- A. In the fraction $\frac{1}{2}$, one is the numerator.
- B. When 4.89 is rounded to the ones place, the answer is 5.
- C. Ten thousandths place is located 5 places to the right of the decimal
- D. $\frac{7}{6}$ is described as an improper fraction.
- E. $33\frac{1}{3}\%$ is equivalent to $\frac{1}{3}$

6. Find the square of $\frac{25}{9}$

- A. $\frac{5}{3}$
- B. $\frac{3}{5}$
- C. $7\frac{58}{81}$
- D. $\frac{15}{2}$
- E. $\frac{650}{81}$

7. Sarah needs to make a cake and some cookies. The cake requires $\frac{3}{8}$ cup of sugar and the cookies require $\frac{3}{5}$ cup of sugar. Sarah has $\frac{15}{16}$ cups of sugar. Does she have enough sugar, or how much more does she need?

- A. She has enough sugar.
- B. She needs $\frac{1}{8}$ of a cup of sugar.
- C. She needs $\frac{3}{80}$ of a cup of sugar.
- D. She needs $\frac{4}{19}$ of a cup of sugar.
- E. She needs $\frac{1}{9}$ of a cup of sugar.

8. There are 8 ounces in a $\frac{1}{2}$ pound. How many ounces are in $7\frac{3}{4}$ lbs?

- A. 12 ounces
- B. 86 ounces
- C. 119 ounces
- D. 124 ounces
- E. 138 ounces

9. If the value of x and y in the following fraction are both tripled, how does the value of the fraction change?

$\frac{XZ}{Y}$

Y

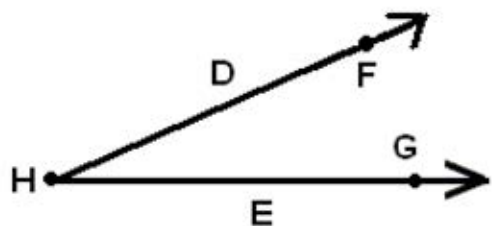
- A. increases by half
- B. decreases by half
- C. triples
- D. doubles
- E. remains the same

10. Which of the following fractions is the equivalent of 0.5%?

- A. $\frac{1}{20}$
- B. $\frac{1}{200}$
- C. $\frac{1}{2000}$
- D. $\frac{1}{5}$
- E. $\frac{1}{500}$

Geometry

1. Which of the following letters represents the vertex in the following picture?

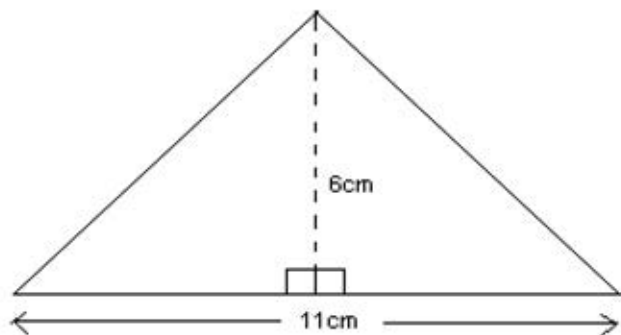


- A. D and E
- B. E and H
- C. F and G
- D. G only
- E. H only

2. If a circle has the diameter of 8, what is the circumference?

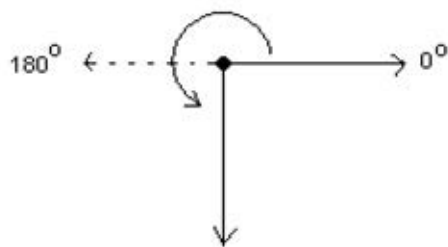
- A. 6.28
- B. 12.56
- C. 25.13
- D. 50.24
- E. 100.48

3. What is the area of the triangle below?



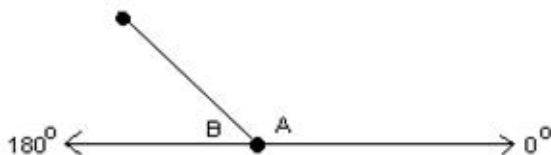
- A. 22 cm^2
- B. 33 cm^2
- C. 44 cm^2
- D. 50 cm^2
- E. 66 cm^2

4. What is the measure of the solid line angle depicted by the following figure?



- A. 90 degrees
- B. 180 degrees
- C. 225 degrees
- D. 270 degrees
- E. 0 degrees

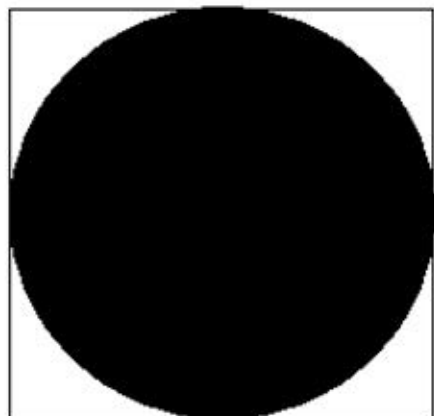
5. What is the measure of angle B in the following figure if angle A measures 135° ?



- A. 40°
- B. 45°
- C. 50°
- D. 135°
- E. 225°

Graphs

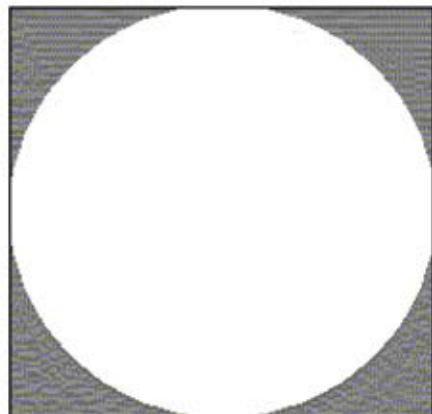
1. In the following figure, what is the area of the shaded circle inside of the square?



4

- A. 512
- B. 256
- C. 16
- D. 50.24
- E. 12.57

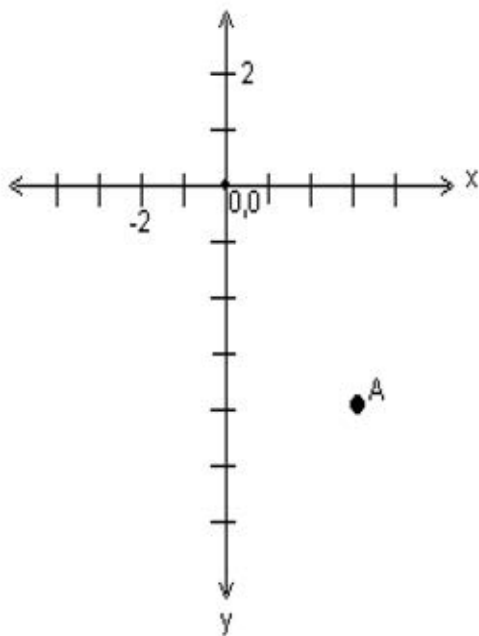
2. In the figure below, determine the area of the shaded region of the figure.



7

- A. 9.354
- B. 10.52
- C. 16.437
- D. 49
- E. 104.86

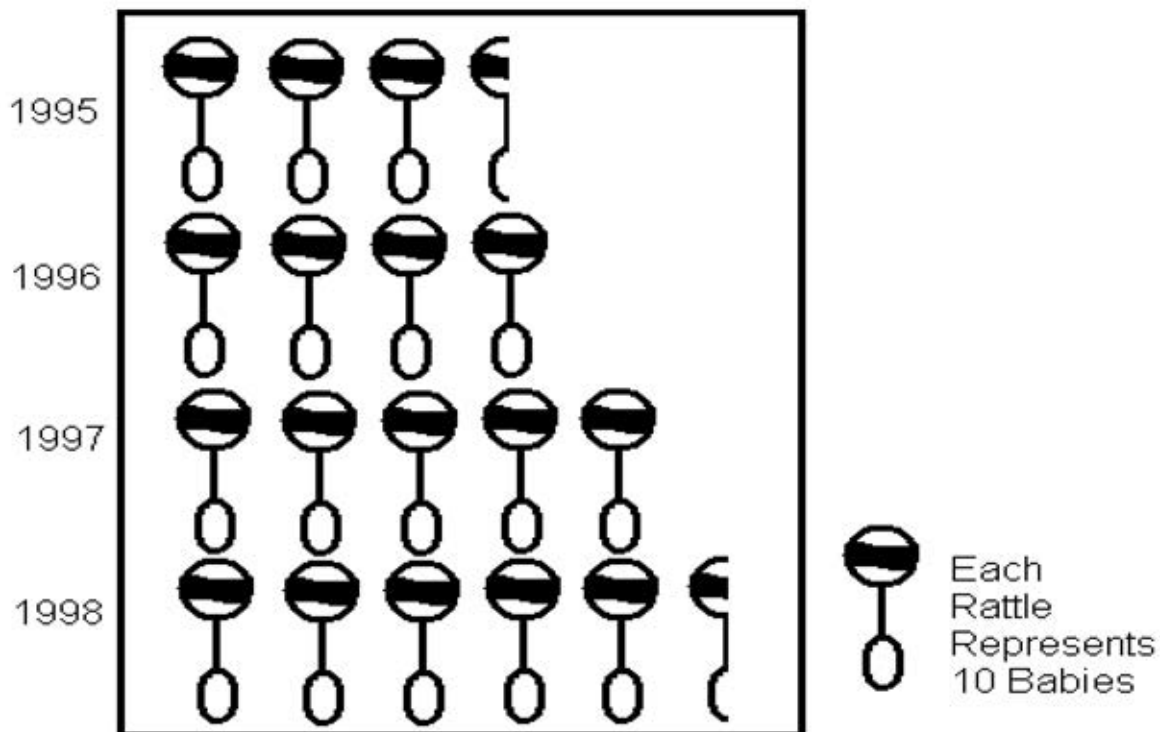
3. What are the coordinates of point A on the following graph?



- A. (-3, -4)
- B. (-4, 3)
- C. (3, -4)
- D. (-4, -3)
- E. (3, 4)

4. What was the average number of babies that Dr. Jones delivered each year from 1995 to 1998?

The Number of Babies Delivered By
Dr. Jones from 1995 to 1998



- A. 35
- B. 40
- C. 45
- D. 50
- E. 55

5. How many babies did Dr. Jones deliver in 1998?

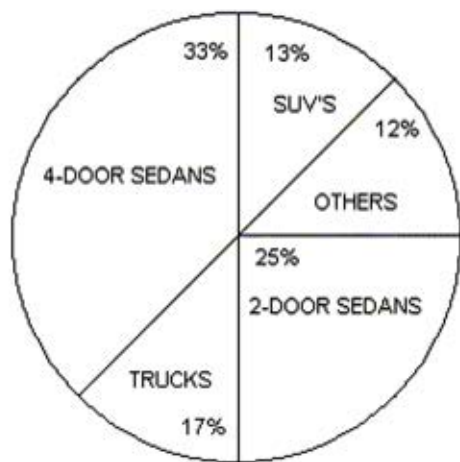
- A. 25
- B. 35
- C. 45
- D. 55
- E. 65

6. If Dr. Jones delivered 85 babies in 1999, how many rattles would represent this number?

- A. $6\frac{1}{2}$
- B. 7
- C. $7\frac{1}{2}$
- D. 8
- E. $8\frac{1}{2}$

7. If XYZ Auto Company sold 23,000 vehicles in 1999, how many were SUV's?

Percentage of Vehicle Types that XYZ
Auto Company sold in 1999



- A. 2,990
- B. 3,030
- C. 3,450
- D. 4,760
- E. 4,775

8. If 7,650 trucks were sold in 1999, how many total vehicles were sold in 1999 by XYZ Auto Company?

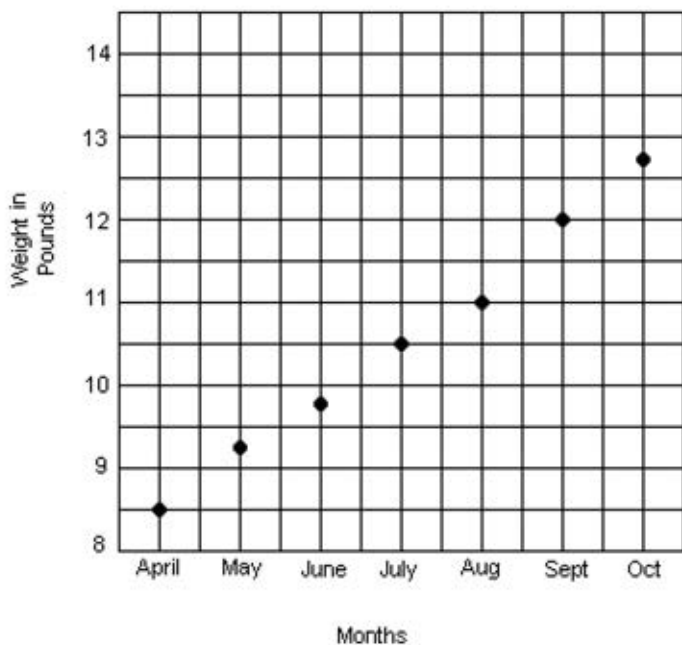
- A. 35,000
- B. 40,000
- C. 45,000
- D. 50,000
- E. 55,000

9. If 3,750 2-door sedans were sold in 1999, then how many 4-door sedans were sold in 1999 by XYZ Auto Company?

- A. 3,578
- B. 4,950
- C. 5,120
- D. 5,670
- E. 5,845

10. How much did the infant gain in the first month of life?

Infant Weight Gain in Pounds
Over First Six Months of Life



- A. 6 ounces
- B. 12 ounces
- C. 15 ounces
- D. 8 lbs 8 ounces
- E. 9 lbs 4 ounces

Estimation and Sequences

- 1. C:** The descending sequence is geometric, with a common ratio of 0.5.
- 2. E:** $11^2=121$, not 144.
- 3. C:** The conversion formula is: $C=(F-32) \cdot 5/9$, where C represents degrees Celsius and F represents degrees Fahrenheit. Substituting 100.7 for F gives: $C=(100.7-32) \cdot 5/9$, which simplifies to $C=68.75/9$. Thus, the temperature, in Celsius, is approximately 38.2° .
- 4. D:** The problem may be modeled by the equation, $0.25x = 8.75$. Solving for x gives $x = 35$. Since he thought he had 2 fewer quarters, he originally thought he had 33 quarters in his pocket.
- 5. C:** The problem may be modeled by the following system of equations: $(a=0+12 @ a+o=36)$. Substituting the expression for a, into the second equation, gives: $0 + 12 + o = 36$. Solving for o gives $o = 24$. Thus, there are 12 oranges. Since there are 36 apples and oranges in all, there must be 24 apples.
- 6. C:** The sequence, 9, 11, 13, 15, shows all odd integers, which are consecutive. The sum of 11 and 13 is indeed 24.
- 7. B:** The sequence is a geometric sequence, with a common ratio of 2. Two times 48 is 96, thus the next number in the sequence is 96.
- 8. B:** The number, 1, is rational, whole, and natural. A rational number is a number that terminates or repeats. A whole number is represented by the sequence, 0, 1, 2, 3, 4, ..., while a natural number is a subset of the whole numbers, and is represented by the sequence, 1, 2, 3, 4,...
- 9. E:** The sequence is a geometric sequence, with a common ratio of $1/2$. Multiplication of $1/8$ by $1/2$ gives $1/16$, which is the next number in the sequence.
- 10. E:** The amount of sugar, needed in a cookie recipe, is best measured by the unit of cups, which is an appropriate measure of capacity.

Exponents

- 1. A:** $10^4=10\cdot 10\cdot 10\cdot 10$, or 10,000.
- 2. C:** When multiplying terms with the same base, the exponents should be added. Thus, $10^4\cdot 10^2=10^6$.
- 3. D:** When dividing terms with the same base, the exponents should be subtracted. Thus, $x^5/x^2 = x^3$.
- 4. D:** The decimal will be moved to the right 9 places. Thus 7 zeros will be added to the right of 823, giving 8,230,000,000.
- 5. B:** Moving the decimal to the right of the digit, 8, gives the equivalent expression, 8.3×10^4 , since there are 4 digits to the right of the 8.
- 6. B:** Moving the decimal to the right of the 8 gives 8.75×10^{-3} , since the decimal must be moved 3 places to the right.

Fractions and Square Roots

- 1. C:** The figure shows 2 completely shaded circles, plus $1/8$ more than $4/8$ shaded on the third circle. Thus, the figure represents the mixed number, $2\frac{5}{8}$.
- 2. B:** The circle shows $1/8$ more than $4/8$, which represents $5/8$.
- 3. C:** The fraction, $12/18$, is not equivalent to the fraction, $3/4$, since the fractions do not represent the same ratio. The denominator for Choice C would need to be 16, for the two fractions to be equivalent.
- 4. B:** The sum equals 0.90, which may also be written as $9/10$.
- 5. C:** The ten thousandths place is located 4 places to the right of the decimal.
- 6. C:** The square of the given fraction may be written as $25^2/9^2$, or $625/81$, which equals $7\frac{58}{81}$.
- 7. C:** The sum of $3/8$ cup of sugar and $3/5$ cup of sugar is $39/40$ cup of sugar. $39/40$ cup of sugar can be compared to $15/16$ cup of sugar by finding a common denominator. Doing so shows that Sarah will need $78/80$ cup of sugar, but only has $75/80$ cup of sugar. Thus, she needs $3/80$ cup of sugar.
- 8. D:** The following proportion may be used to find the solution: $8/0.5=x/7.75$. Solving for x gives $x = 124$. Thus, there are 124 ounces in $7\frac{3}{4}$ pounds.

9. **E:** The value does not change because the 3 in the numerator and the 3 in the denominator cancel.
 $3XZ/3Y=XZ/Y$.

10. **B:** $0.5\% = 0.005$, which may be written as $5/1000$, which reduces to $1/200$.

Geometry

1. **E:** The vertex is the point, formed by the two rays of an angle. Thus, H is the vertex of the angle.

2. **C:** $C=\pi d$. Substituting 8 for d gives $C=8\pi$, where C is approximately 25.13.

3. **B:** The area of a triangle may be found by using the formula, $A=1/2bh$, where b represents the base and h represents the height. Thus, the area may be written as $A=1/2(11)(6)$, or $A = 33$. The area of the triangle is 33 cm^2 .

4. **D:** The sum of the angles, formed by the perpendicular rays is 360° , thus the curved arrow represents an angle measure that is equal to the difference of 360° and 90° , or 270° .

5. **B:** Since angles A and B are supplementary, the measure of angle B is equal to the difference of 180° and 135° , or 45° .

Graphs

1. **E:** The area of the circle may be found by using the formula, $A=\pi r^2$. Since the square has a diameter of 4, the circle has a radius of 2. Substituting 2 for r , into the formula above, gives $A=\pi(2)^2$, or $A=4\pi$. Thus, the area of the circle is approximately 12.57 square units.

2. **B:** The area of the square is equal to 7^2 , or 49, square units. The area of the circle may be represented as $\pi(3.5)^2$, or 12.25π , which is approximately 38.48 square units. The area of the shaded portion of the figure equals the difference of 49 square units and 38.48 square units, or 10.52 square units.

3. **C:** The point represents the x -value of 3 and the y -value of -4, thus the ordered pair may be written as (3, -4).

4. **C:** The average may be written as $(35+40+50+55)/4$, which equals 45.

5. **D:** Since each rattle represents the delivery of 10 babies, $5\frac{1}{2}$ rattles represents the delivery of 55 babies.

6. **E:** Delivery of 85 babies would be represented by 8 whole rattles and $\frac{1}{2}$ of another rattle, since $\frac{1}{2} \cdot 10=5$.

7. **A:** The number of SUVs sold is equal to $0.13 \times 23,000$, or 2,990.

8. **C:** If 7,650 trucks are sold, which constitutes 17% of the total number of vehicles sold, then the total number of vehicles sold may be determined by solving the equation, $7650 = 0.17x$. Dividing both sides of the equation by 0.17 gives 45,000.

9. **B:** The total number of vehicles sold may be determined by solving the following equation for x : $0.25x = 3,750$. Thus, 15,000 vehicles were sold. The number of 4-door sedans is equal to the product of 0.33 and 15,000, or 4,950.

10. **B:** The weight increased from 8.5 pounds to 9.25 pounds, showing an increase of 0.75 pounds. The number of pounds may be converted to ounces by writing and solving the following proportion: $0.75/x = 1/16$. Thus, the infant gained 12 ounces during the first month of life.