STUDENTS ENTERING MATH 2 – ANSWER KEY

Shepherd Middle School

Summer Packet

REVIEW: Exponents

Name _____

Key Concept and Vocabulary

multiplication — exponent

$2 \cdot 2 \cdot 2 = 2^3$

base

Exponent

4 to the first power

$4^1 = 4$

$4^2 = 4 \cdot 4$ — 4 squared

$4^3 = 4 \cdot 4 \cdot 4$ — 4 cubed

Skill Examples

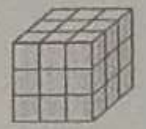
1. $3^2 = 3 \cdot 3 = 9$
2. $2^4 = 2 \cdot 2 \cdot 2 \cdot 2 = 16$
3. $4^3 = 4 \cdot 4 \cdot 4 = 64$
4. $5^4 = 5 \cdot 5 \cdot 5 \cdot 5 = 625$
5. $9^5 = 9 \cdot 9 \cdot 9 \cdot 9 \cdot 9 = 59{,}049$

Application Example

6. How many small cubes are in the stack?

$3^3 = 3 \cdot 3 \cdot 3$

$= 27$



∴ 27 small cubes are in the stack.

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Check your answers at BigIdeasMath.com.

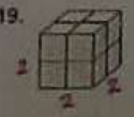
Find the value.

7. $3^4 =$ 81 (3 · 3 · 3 · 3)
8. $4^5 =$ 1024 (4 · 4 · 4 · 4 · 4)
9. $12^3 =$ 1728
10. $18^1 =$ 18
11. $5^6 =$ 15,625
12. $2^{10} =$ 1024
13. $8^2 =$ 64
14. $7^3 =$ 343

Use an exponent to rewrite the expression.

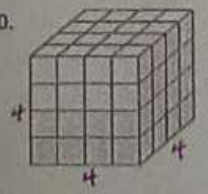
15. $4 \cdot 4 \cdot 4 \cdot 4 =$ 4^4
16. $1 \cdot 1 \cdot 1 =$ 1^3
17. $5 \cdot 5 \cdot 5 =$ 5^3
18. $3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 =$ 3^5

How many small cubes are in the stack?

19. 

2^3

8 cubes

20. 

4^3

64 cubes

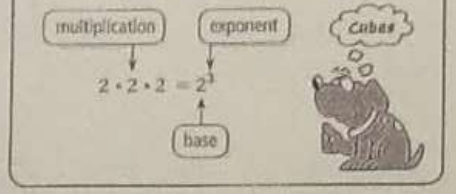
21. **FLYING SAUCERS** You saw 5 flying saucers. Each flying saucer had 5 aliens. Each alien had 5 eyes. How many alien eyes were there altogether? Explain your reasoning.

125 alien eyes $5^3 = 5 \cdot 5 \cdot 5$

REVIEW: Cubes

Name _____

Key Concept and Vocabulary



Visual Model

$2^3 =$

Skill Examples

1. $2^3 = 2 \cdot 2 \cdot 2 = 8$
2. $5^3 = 5 \cdot 5 \cdot 5 = 125$
3. $7^3 = 7 \cdot 7 \cdot 7 = 343$
4. $9^3 = 9 \cdot 9 \cdot 9 = 729$
5. $20^3 = 20 \cdot 20 \cdot 20 = 8000$

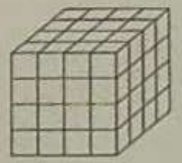
Application Example

6. How many small cubes are in the stack?

$4^3 = 4 \cdot 4 \cdot 4$

$= 64$

∴ 64 small cubes are in the stack.



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Check your answers at BigIdeasMath.com.

Find the value.

7. $6^3 =$ 216
8. $3^3 =$ 27
9. $8^3 =$ 512
10. $10^3 =$ 1000
11. $12^3 =$ 1728
12. $15^3 =$ 3375

Use an exponent to rewrite the expression.

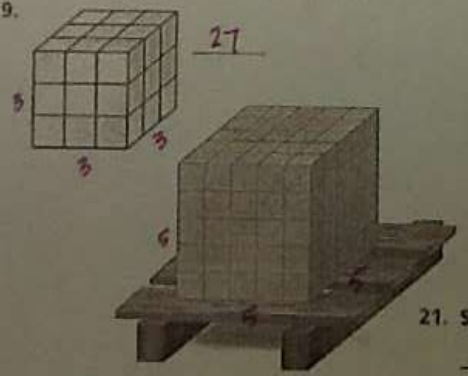
13. $16 \cdot 16 \cdot 16 =$ 16^3
14. $11 \cdot 11 \cdot 11 =$ 11^3
15. $25 \cdot 25 \cdot 25 =$ 25^3

Evaluate the expression when $x = 3$.

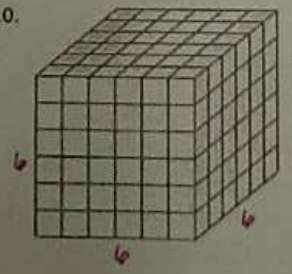
16. $x^3 + 1$ $27 + 1$ 28
17. $2x^3$ $2(27)$ 54
18. $6x - x^3$ $6(3) - 27$ -9

How many small cubes are in the stack?

19. 27



20. 216



21. **SHIPPING** How many boxes are on the pallet?

125

REVIEW: Order of Operations

Name _____

Key Concept and Vocabulary

"Please Excuse My Dear Aunt Sally"

1st Parentheses
2nd Exponents
3rd Multiplication and Division (from left to right)
4th Addition and Subtraction (from left to right)

Simplify $4^2 + 2 + 3(9 - 5)$.

$4^2 + 2 + 3(9 - 5) = 4^2 + 2 + 3 \cdot 4$
$= 16 + 2 + 3 \cdot 4$
$= 8 + 12$
$= 20$

Skill Examples

1. $18 \div 2 - 4 = 9 - 4 = 5$
2. $12 \cdot (6 - 2) = 12 \cdot 4 = 48$
3. $14 \cdot 3 - 19 = 42 - 19 = 23$
4. $20 \div 10 + 21 \cdot 5 = 2 + 105 = 107$
5. $(2 + 3)^2 - 5 = 25 - 5 = 20$

Application Example

6. At a museum, 4 adults pay $5 each and 6 children pay $3 each. What is the total cost of the tickets?

$4 \cdot 5 + 6 \cdot 3 = 20 + 18$
$= 38$

∴ The total cost is $38.

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Check your answers at BigIdeasMath.com.

Simplify.

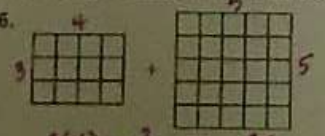
7. $3^2 + 5(4 - 2) =$ 19 (9 + 10)
8. $3 + 4 \div 2 =$ 5 (3 + 2)
9. $10 \div 5 \cdot 3 =$ 6 (2 · 3)
10. $4(3^3 - 8) \div 2 =$ 38
11. $3 \cdot 6 - 4 \div 2 =$ 16
12. $12 \div 7 \cdot 3 - 24 =$ 9

Insert parentheses to make the statement true.

13. $(5^2 - 15) \div 5 = 2$
14. $12 \cdot (2^3 + 4) = 144$
15. $(91 - 21) \div 7 = 10$

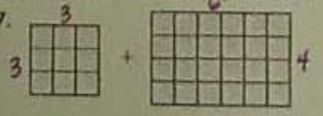
Write an expression for the total area of the two rectangles. Evaluate your expression.

16.



$3(4) + 5^2 = 37$

17.



$3^2 + 6(4) = 33$

18. **ADMISSION** At a baseball game, 6 adults pay $20 each and 4 children pay $10 each. What is the total cost of the tickets? $160 $6(20) + 4(10)$

19. **INSERTING PARENTHESES** Insert parentheses in the expression $4 + 2^3 - 5 \cdot 2$ in two ways: (a) so that the value is 10 and (b) so that the value is 14.

(a) $4 + (2^3 - 5) \cdot 2$

(b) $(4 + 2^3 - 5) \cdot 2$

REVIEW: Adding and Subtracting Fractions with Unlike Denominators

Name _____

Key Concept and Vocabulary

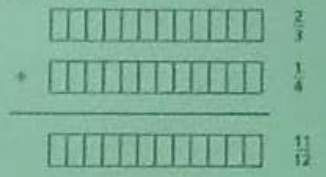
Find products.

$\frac{2}{3} \times \frac{1}{4} = \frac{2 \cdot 4 + 3 \cdot 1}{3 \cdot 4} = \frac{11}{12}$

$\frac{2}{3} \times \frac{1}{4} = \frac{2 \cdot 4 - 3 \cdot 1}{3 \cdot 4} = \frac{5}{12}$

Unlike Denominators

Visual Model



Skill Examples

1. $\frac{1}{5} + \frac{2}{3} = \frac{1 \cdot 3 + 5 \cdot 2}{5 \cdot 3} = \frac{13}{15}$
2. $\frac{1}{2} + \frac{1}{4} = \frac{1 \cdot 4 + 2 \cdot 1}{2 \cdot 4} = \frac{6}{8} = \frac{3}{4}$
3. $\frac{1}{3} - \frac{1}{4} = \frac{1 \cdot 4 - 3 \cdot 1}{3 \cdot 4} = \frac{1}{12}$
4. $\frac{3}{7} - \frac{2}{5} = \frac{3 \cdot 5 - 7 \cdot 2}{7 \cdot 5} = \frac{1}{35}$

Application Example

5. You ride your bike $\frac{3}{8}$ mile to the store. Then you ride $\frac{1}{6}$ mile to school. How far do you ride altogether?

$\frac{3}{8} + \frac{1}{6} = \frac{3 \cdot 6 + 8 \cdot 1}{8 \cdot 6} = \frac{26}{48} = \frac{13}{24}$

∴ You ride $\frac{13}{24}$ mile.

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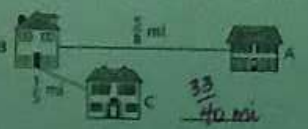
Check your answers at BigIdeasMath.com.

Find the sum or difference. Write your answer in simplified form.

6. $\frac{1}{3} + \frac{1}{8} =$ $\frac{11}{24}$
7. $\frac{2}{3} + \frac{1}{5} =$ $\frac{13}{15}$
8. $\frac{3}{10} + \frac{1}{4} =$ $\frac{11}{20}$
9. $\frac{1}{2} + \frac{2}{5} =$ $\frac{9}{10}$
10. $\frac{3}{7} + \frac{1}{3} =$ $\frac{16}{21}$
11. $\frac{1}{8} + \frac{2}{5} =$ $\frac{21}{40}$
12. $\frac{5}{8} - \frac{1}{3} =$ $\frac{7}{24}$
13. $\frac{5}{6} - \frac{3}{5} =$ $\frac{7}{30}$
14. $\frac{5}{9} - \frac{2}{5} =$ $\frac{7}{45}$
15. $\frac{7}{10} - \frac{1}{4} =$ $\frac{9}{20}$
16. $\frac{3}{5} - \frac{1}{6} =$ $\frac{13}{30}$
17. $\frac{1}{5} - \frac{1}{6} =$ $\frac{1}{30}$

Find the total distance from House A to House B and then to House C.

18. 

$\frac{33}{40}$ mi

19. 

$\frac{17}{20}$ mi

20. **WEASEL LENGTH** Find the total length of the weasel.

$\frac{9}{20}$ yd

21. **IMPROVING YOUR SPEED** You swam at a rate of $\frac{3}{8}$ mile per hour in March. You swam at a rate of $\frac{3}{7}$ mile per hour in April. How much faster did you swim in April?

$\frac{3}{56}$ mph

REVIEW: Multiplying Fractions

Name _____

Key Concept and Vocabulary

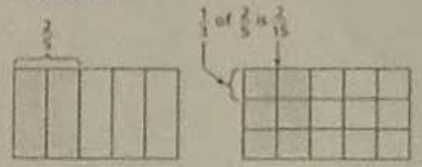
Multiply numerators.

$\frac{1}{3} \cdot \frac{2}{5} = \frac{1 \cdot 2}{3 \cdot 5} = \frac{2}{15}$

Multiply denominators.

Multiply fractions.

Visual Model



Skill Examples

1. $\frac{2}{3} \cdot \frac{1}{4} = \frac{2 \cdot 1}{3 \cdot 4} = \frac{2}{12} = \frac{1}{6}$
2. $\frac{3}{8} \times \frac{2}{9} = \frac{3 \cdot 2}{8 \cdot 9} = \frac{6}{72} = \frac{1}{12}$
3. $\left(\frac{2}{5}\right)\left(\frac{1}{4}\right) = \frac{2 \cdot 1}{5 \cdot 4} = \frac{2}{20} = \frac{1}{10}$
4. $\frac{1}{7} \cdot \frac{3}{5} = \frac{1 \cdot 3}{7 \cdot 5} = \frac{3}{35}$

Application Example

5. A recipe calls for three-fourths cup of flour. You want to make one-half of the recipe. How much flour should you use?

$\frac{1}{2} \cdot \frac{3}{4} = \frac{1 \cdot 3}{2 \cdot 4} = \frac{3}{8}$

You should use $\frac{3}{8}$ cup flour.

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Check your answers at BigIdeasMath.com.

Find the product. Write your answer in simplified form.

6. $\frac{1}{3} \cdot \frac{2}{7} = \frac{2}{21}$
7. $\frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$
8. $\frac{1}{10} \cdot \frac{3}{10} = \frac{3}{100}$
9. $\frac{3}{2} \cdot \frac{2}{5} = \frac{6}{10} = \frac{3}{5}$
10. $\frac{3}{8} \times \frac{1}{2} = \frac{3}{16}$
11. $\left(\frac{1}{5}\right)\left(\frac{2}{5}\right) = \frac{2}{25}$
12. $\left(\frac{2}{3}\right)^2 = \frac{2}{3} \cdot \frac{2}{3} = \frac{4}{9}$
13. $\frac{2}{3} \cdot \frac{3}{2} = \frac{6}{6} = \frac{1}{1}$
14. $\left(\frac{3}{1}\right)\left(\frac{1}{3}\right) = \frac{3}{3} = 1$
15. $2 \cdot \frac{1}{4} = \frac{2}{4} = \frac{1}{2}$
16. $3 \times \frac{3}{4} = \frac{9}{4} = 2\frac{1}{4}$
17. $\frac{1}{3} \cdot \frac{5}{4} \cdot \frac{4}{5} = \frac{12}{60} = \frac{1}{5}$

Find the area of the rectangle or parallelogram.

18. $\frac{1}{2}$ ft, $\frac{1}{2}$ ft

Area = $\frac{1}{4}$ ft^2

19. $\frac{3}{10}$ cm, $\frac{1}{2}$ cm

Area = $\frac{3}{20}$ cm^2

20. $\frac{3}{8}$ in., $\frac{5}{8}$ in.

Area = $\frac{15}{64}$ in.^{2}

21. $\frac{2}{5}$ m, $\frac{3}{5}$ m

Area = $\frac{6}{25}$ m^2

22. **OPEN-ENDED** Find three different pairs of fractions that have the same product.

$\square \cdot \square = \square$ $\square \cdot \square = \square$ $\square \cdot \square = \square$

REVIEW: Dividing Fractions

Name _____

Key Concept and Vocabulary

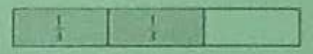
$\frac{2}{3} \div \frac{1}{2} = \frac{2}{3} \cdot \frac{2}{1} = \frac{2 \cdot 2}{3 \cdot 1} = \frac{4}{3}$

Invert and multiply.

Visual Model

There are 2 "one-thirds" in two-thirds.

$\frac{2}{3} \div \frac{1}{3} = \frac{2}{3} \cdot \frac{3}{1} = 2$



Skill Examples

1. $\frac{2}{5} \div \frac{1}{5} = \frac{2}{5} \cdot \frac{5}{1} = \frac{2 \cdot 5}{5 \cdot 1} = 2$
2. $\frac{2}{5} \div 5 = \frac{2}{5} \cdot \frac{1}{5} = \frac{2 \cdot 1}{5 \cdot 5} = \frac{2}{25}$
3. $\frac{9}{4} \div \frac{3}{4} = \frac{9}{4} \cdot \frac{4}{3} = \frac{9 \cdot 4}{4 \cdot 3} = 3$
4. $6 \div \frac{1}{2} = \frac{6}{1} \cdot \frac{2}{1} = \frac{6 \cdot 2}{1 \cdot 1} = 12$

Application Example

5. You drive 25 miles in one-half hour. What is your average rate?

$25 \div \frac{1}{2} = \frac{25}{1} \cdot \frac{2}{1} = 50$ mi/h $\quad r = \frac{d}{t}$

∴ Your average rate is 50 miles per hour.

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Find the quotient. Write your answer in simplified form.

6. $\frac{3}{5} \div \frac{1}{5} = \frac{15}{5} = 3$
7. $4 \div \frac{1}{2} = \frac{8}{1} = 8$
8. $\frac{2}{3} \div \frac{1}{6} = \frac{12}{3} = 4$
9. $\frac{1}{6} \div \frac{2}{3} = \frac{3}{12} = \frac{1}{4}$
10. $\frac{2}{3} \div 2 = \frac{2}{6} = \frac{1}{3}$
11. $\frac{3}{4} \div 4 = \frac{3}{16}$
12. $\frac{3}{7} \div \frac{3}{7} = \frac{21}{21} = 1$
13. $\frac{3}{7} \div \frac{7}{3} = \frac{9}{49}$
14. $5 \div \frac{1}{2} = \frac{10}{1} = 10$
15. $\frac{9}{4} \div \frac{1}{4} = \frac{36}{4} = 9$
16. $\frac{1}{4} \div \frac{1}{2} = \frac{2}{4} = \frac{1}{2}$
17. $\frac{3}{11} \div 11 = \frac{3}{121}$

Find the height of the rectangle or parallelogram.

18. $\frac{1}{2}$ ft, $\frac{1}{2}$ ft — Area $= \frac{1}{4}$ ft^2 $\frac{1}{4} \div \frac{1}{2} = \frac{1}{4} \cdot \frac{2}{1}$
19. $\frac{1}{5}$ cm, $\frac{2}{5}$ cm — Area $= \frac{2}{25}$ cm^2 $\frac{2}{25} \div \frac{2}{5} = \frac{2}{25} \cdot \frac{5}{2}$
20. $\frac{1}{2}$ in, $\frac{5}{8}$ in — Area $= \frac{3}{16}$ in.^{2}
21. $\frac{1}{5}$ m, $\frac{1}{10}$ m — Area $= \frac{1}{50}$ m^2

22. **SPEED** You drive 15 miles in one-fourth hour. What is your average speed? $\frac{15}{1} \div \frac{1}{4} = 60$ mph

23. **MAGNETIC TAPE** A refrigerator magnet uses $\frac{5}{8}$ inch of magnetic tape. How many refrigerator magnets can you make with 10 inches of magnetic tape? Explain.

$10 \div \frac{5}{8} = \frac{10}{1} \cdot \frac{8}{5} =$ 16 magnets

REVIEW: Multiplying Mixed Numbers

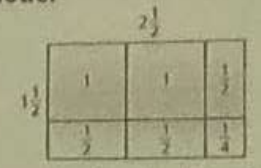
Name _____

Key Concept and Vocabulary

$2\frac{1}{2} \times 1\frac{1}{2} = \frac{5}{2} \times \frac{3}{2} = \frac{15}{4}$

Rewrite as improper fractions.

Visual Model



Area $= 2\frac{1}{2} \times 1\frac{1}{2} = \frac{15}{4} = 3\frac{3}{4}$

Skill Examples

1. $3\frac{1}{2} \times 2\frac{1}{3} = \frac{7}{2} \times \frac{7}{3} = \frac{49}{6} = 8\frac{1}{6}$
2. $1\frac{3}{4} \cdot 4\frac{1}{2} = \frac{7}{4} \cdot \frac{9}{2} = \frac{63}{8} = 7\frac{7}{8}$
3. $2\frac{2}{5} \times 1\frac{2}{3} = \frac{12}{5} \times \frac{5}{3} = \frac{60}{15} = 4$
4. $\left(1\frac{1}{2}\right)\left(1\frac{1}{2}\right) = \left(\frac{3}{2}\right)\left(\frac{3}{2}\right) = \frac{9}{4} = 2\frac{1}{4}$

Application Example

5. Find the area of the triangle.

Area $= \frac{1}{2} \cdot 1\frac{1}{2} \cdot 3$

$= \frac{1}{2} \cdot \frac{3}{2} \cdot \frac{3}{1} = \frac{9}{4} = 2\frac{1}{4}$

∴ The area is $2\frac{1}{4}$ square inches.

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Find the product. Write your answer as a whole number or mixed number in simplified form.

6. $2\frac{1}{3} \times 1\frac{1}{3} = \frac{7}{3} \cdot \frac{4}{3} = \frac{28}{9} = 3\frac{1}{9}$
7. $4\frac{2}{3} \times 1\frac{1}{2} = \frac{39}{6} = 6\frac{1}{2}$
8. $1\frac{1}{2} \times 3 = \frac{9}{2} = 4\frac{1}{2}$
9. $5\frac{1}{6} \times \frac{1}{3} = \frac{31}{18} = 1\frac{13}{18}$
10. $\frac{3}{4} \cdot 3\frac{1}{2} = \frac{21}{8} = 2\frac{5}{8}$
11. $5 \cdot 4\frac{1}{2} = \frac{45}{2} = 22\frac{1}{2}$
12. $2\frac{1}{7} \cdot \frac{7}{15} = \frac{105}{105} = 1$
13. $1\frac{3}{5} \cdot \frac{3}{8} = \frac{24}{40} = \frac{3}{5}$
14. $\left(1\frac{1}{3}\right)^2 = \frac{4}{3} \cdot \frac{4}{3} = \frac{16}{9} = 1\frac{7}{9}$
15. $\left(1\frac{1}{4}\right)^3 = \frac{25}{16} = 1\frac{9}{16}$
16. $\left(2\frac{1}{2}\right)\left(3\frac{1}{3}\right) = \frac{50}{6} = 8\frac{1}{3}$
17. $\left(3\frac{1}{2}\right)\left(\frac{1}{2}\right)^2 = \frac{7}{8}$

$\frac{7}{2} \cdot \frac{1}{4}$

Find the area of the triangle. $\frac{5}{4} \cdot \frac{5}{4}$

18. $\frac{1}{2}$ in., $2\frac{1}{2}$ in.

Area $= \frac{15}{4} = 3\frac{3}{4}$ in.^{2}

19. $2\frac{2}{3}$ cm, 4 cm

Area $= \frac{32}{12} = 2\frac{2}{3}$ cm^2

20. **RECIPE** Rewrite the recipe so that each item is one-third of the full recipe.

$2\frac{1}{2}$ cups flour
2 tsp baking powder
4 Tbsp butter
$\frac{1}{2}$ tsp salt
$\frac{1}{4}$ cup milk

$\frac{5}{6}$ cups flour

$\frac{2}{3}$ tsp baking powder

$1\frac{1}{3}$ Tbsp butter

$\frac{1}{6}$ tsp salt

$\frac{1}{4}$ cup milk

REVIEW: Dividing Mixed Numbers

Name _____

Key Concept and Vocabulary

Rewrite as improper fractions.

$2\frac{1}{2} \div 5 = \frac{5}{2} \div \frac{5}{1}$

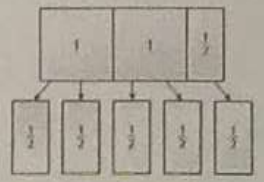
$= \frac{5}{2} \times \frac{1}{5}$

$= \frac{1}{2}$

Visual Model

Divide $2\frac{1}{2}$ into five equal parts. Each part is $\frac{1}{2}$.

$2\frac{1}{2} \div 5 = \frac{1}{2}$



Skill Examples

1. $5 \div 2\frac{1}{2} = \frac{5}{1} \div \frac{5}{2} = \frac{5}{1} \times \frac{2}{5} = 2$
2. $3\frac{3}{4} \div 2\frac{1}{2} = \frac{15}{4} \div \frac{5}{2} = \frac{15}{4} \times \frac{2}{5} = \frac{3}{2} = 1\frac{1}{2}$
3. $4\frac{1}{6} \div 1\frac{2}{3} = \frac{25}{6} \div \frac{5}{3} = \frac{25}{6} \times \frac{3}{5} = \frac{5}{2} = 2\frac{1}{2}$
4. $7\frac{1}{3} \div 11 = \frac{22}{3} \div \frac{11}{1} = \frac{22}{3} \times \frac{1}{11} = \frac{2}{3}$

Application Example

5. You need $2\frac{1}{2}$ inches of ribbon to make a Blue-Ribbon award. How many awards can you make with 35 inches of ribbon?

$35 \div 2\frac{1}{2} = \frac{35}{1} \div \frac{5}{2} = \frac{35}{1} \times \frac{2}{5} = 14$

∴ You can make 14 awards.

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Check your answers at BigIdeasMath.com.

Find the quotient. Write your answer as a whole or mixed number in simplest form.

6. $4\frac{1}{2} \div 9 = \frac{9}{2} \div \frac{9}{1} = \frac{9}{2} \cdot \frac{1}{9} = \frac{9}{18} = \frac{1}{2}$
7. $3\frac{3}{7} \div 8 =$ $\frac{3}{7}$
8. $4\frac{2}{3} \div 7 =$ $\frac{2}{3}$
9. $1\frac{7}{9} \div 4 =$ $\frac{4}{9}$
10. $8 \div 1\frac{1}{3} =$ 6
11. $32 \div 3\frac{1}{5} =$ 10
12. $11 \div 2\frac{3}{4} =$ 4
13. $9 \div 1\frac{1}{2} =$ 6
14. $5\frac{1}{2} \div \frac{1}{2} =$ 11
15. $\frac{1}{2} \div 1\frac{1}{2} =$ $\frac{1}{3}$
16. $1\frac{1}{4} \div 1\frac{1}{4} =$ 1
17. $3\frac{1}{2} \div 1\frac{1}{3} =$ $2\frac{5}{8}$

Find the missing dimension.

18. $2\frac{1}{2}$ ft; Area = 10 ft²; 4 ft

$10 \div 2\frac{1}{2} = \frac{10}{1} \cdot \frac{2}{5}$

19. 3 cm; $5\frac{1}{3}$ cm; Area = 16 cm²

$16 \div 5\frac{1}{3} = \frac{16}{1} \cdot \frac{3}{16}$

20. **RED RIBBONS** You need $3\frac{1}{2}$ inches of ribbon to make a Red-Ribbon award. How many awards can you make with 35 inches of ribbon? 10 awards $35 \div 3\frac{1}{2}$

21. **SHIPPING** You are stacking books into a shipping box that is 15 inches high. Each book is $1\frac{1}{4}$ inches thick. How many books can you fit in a stack? 12 books $15 \div 1\frac{1}{4}$

1. 30% of 50: $0.3 \times 50 = 15$

2. 45% of 80: $0.45 \times 80 = 36$

3. 110% of 40: $1.1 \times 40 = 44$

4. 25% of 240: $0.25 \times 240 = 60$

5. 28% of the 200 people who answered a survey own a dog. How many of the 200 people in the survey own a dog?

$0.28 \times 200 = 56$

∴ 56 of the 200 people own a dog.

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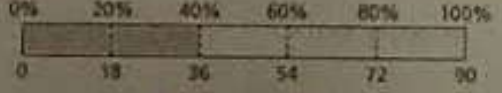
Check your answers at BigIdeasMath.com.

Find the percent of the number.

6. 25% of 40 = 10
7. 20% of 35 = 7
8. 65% of 110 = 71.5
9. 125% of 20 = 25
10. $33\frac{1}{3}$% of 60 = 20
11. 95% of 400 = 380
12. 200% of 31 = 62
13. 18% of 90 = 16.2
14. 1% of 800 = 8
15. 60% of 60 = 36
16. 100% of 59 = 59
17. 1000% of 59 = 590

Write the question represented by the model. Then answer the question.

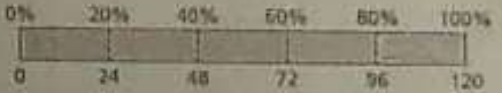
18.



Question: 40% of 90

Answer: 36

19.



Question: 100% of 120

Answer: 120

20. **ENDANGERED SPECIES** Sixty percent of a species of butterfly died due to loss of habitat. Originally, there were 10,000 butterflies. How many are left? 4,000

21. **SALES TAX** You buy 4 breakfast sandwiches at $2.59 each, 4 hashbrowns at $1.10 each, and 4 bottles of orange juice at $1.25 each. The sales tax is 6%. Find the total cost of the 4 meals, including sales tax. $20.95

6% of 19.76 = 1.18 tax

19.76 + 1.18

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Check your answers at BigIdeasMath.com.

Write the unit rate in words and as a fraction for each situation.

5. You fly 2000 miles in 4 hours.
   Words: 2000 miles / 4 hrs
   Fraction: $\frac{500}{1}$ mph

6. You pay 15 dollars for 3 pizzas.
   Words: $15 / 3 pizzas
   Fraction: $\frac{\$5}{1}$ pizza

7. You pay $4 sales tax on a $50 purchase.
   Words: $4 tax / $50 purchase
   Fraction: $\frac{\$0.08}{1}$ purchase

8. You earn $25 for mowing 5 lawns.
   Words: $25 / 5 lawns
   Fraction: $\frac{\$5}{1}$ lawn

Circle the name of the person with the greater unit rate.

9. (Maria) saves $50 in 4 months. $12.50
   Ralph saves $60 in 5 months. $12

10. John rides his bicycle 36 miles in 3 hours. $12
    same
    Randy rides his bicycle 30 miles in 2.5 hours. $12

11. Kim earns $400 for working 40 hours.
    Sam earns $540 for working 45 hours.

12. Arlene scores 450 points on 5 tests. 90 pts
    same
    Jolene scores 180 points on 2 tests. 90 pts

Convert the unit rate.

13. $\frac{60 \text{ miles}}{1 \text{ hour}} = \frac{88 \text{ feet}}{1 \text{ second}}$ $\frac{60}{60m} = \frac{60}{3600s} = \frac{1m}{60s} = \frac{5280}{60}$

14. $\frac{2 \text{ gallons}}{1 \text{ hour}} = \frac{.53 \text{ cups}}{1 \text{ minute}}$ $\frac{2g}{60m} = \frac{32c}{60m} = \frac{16}{30} = \frac{8c}{15min}$

2. $\frac{1}{7} = \frac{7}{48}$ is not a proportion because the cross products are not equal.

3. $\frac{10}{2} = \frac{5}{1}$ is a proportion because the cross products are equal.

$\frac{\$5}{3 \text{ balls}} \stackrel{?}{=} \frac{\$6.25}{4 \text{ balls}}$ $5(4) \neq 3(6.25)$

∴ The rates are *not* proportional.

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Check your answers at BigIdeasMath.com.

Decide whether the statement is a proportion.

5. $\frac{3}{7} = \frac{6}{14}$ yes

6. $\frac{1}{4} \neq \frac{4}{1}$ not

7. $\frac{3}{2} \neq \frac{9}{4}$ not

8. $\frac{1.25}{3} = \frac{5}{12}$ yes

9. $\frac{6}{18} = \frac{120}{360}$ yes

10. $\frac{4}{5} = \frac{4+4}{5+5}$ yes

Complete the proportion.

11. $\frac{2}{5} = \frac{\boxed{4}}{10}$

12. $\frac{1}{6} = \frac{4}{\boxed{24}}$

13. $\frac{3}{\boxed{8}} = \frac{9}{24}$

Write the proportion that compares the circumference to the radii of the two circles.

14. $r = 2$ $r = 3$

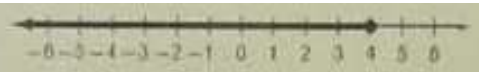
$C = \pi \cdot d$

$\frac{12.56}{2} = \frac{18.84}{3}$

15. $r = 4$ $r = 5$

$\frac{25.12}{4} = \frac{31.4}{5}$

16. **COMPARING RATES** You spend \$20 for 5 T-shirts. Your friend spends \$15 for 3 T-shirts. Are the two rates proportional? $\frac{20}{5} \neq \frac{15}{3}$ $\frac{4}{1} \neq \frac{5}{1}$



a. $x > 4$ b. $x \geq 4$

(c) $x \leq 4$ d. $x < 4$

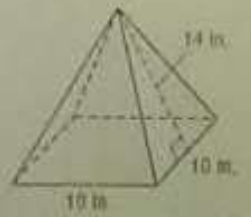
2. A muffin recipe calls for a ratio of 5 cups of flour to 2 cups of sugar. For each cup of sugar that is used, how many cups of flour are needed?

(a) $\frac{5}{2}$ cups of flour b. $\frac{5}{7}$ cups of flour

c. $\frac{2}{5}$ cups of flour d. $\frac{2}{7}$ cups of flour

sugar $\frac{1}{\text{flour } 2.5} = \frac{2}{5}$

3. What is the surface area of a square pyramid with base side lengths of 10 inches and a slant height of 14 inches



$4\left(\frac{10 \cdot 14}{2}\right) + 10^2$

$4(\triangle) + \square$

a. 220 in^2 b. 280 in^2

(c) 380 in^2 d. 660 in^2

4. There are 65 people watching a movie at a theater. If 40% of the customers purchased refreshments for the movie, how many customers purchased refreshments?

(a) 26 customers b. 34 customers

c. 39 customers d. 163 customers

$0.4(65)$

5. Marcos needs to earn a grade *higher than* 88 on his final quiz in order to have an A average. Which inequality best represents this situation?

a. $g \geq 88$ (b) $g > 88$

c. $g < 88$ d. $g \leq 88$

6. Which property is represented by the equation shown below?

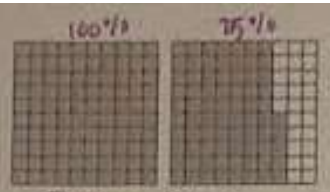
$8 \cdot 3 = 3 \cdot 8$

a. Multiplicative Inverse Property

b. Multiplicative Identity Property

c. Associative Property of Multiplication

(d) Commutative Property of Multiplication



(a) 175% b. 125%
c. 75% d. 25%

8. Pamela is the leading server on her volleyball team. On average, she serves an ace 44% of the time. If she attempts 25 serves in her next game, how many aces would you expect her to have?

a. 57 aces b. 19 aces $25(0.44) = a$ $\frac{44}{100} = \frac{?}{25}$
(c) 11 aces d. 6 aces

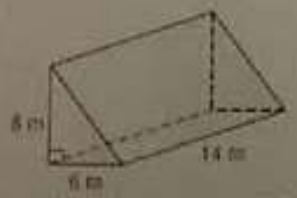
9. Which type of data display would be best for showing how data change over time?

a. box plot b. histogram
(c) line graph d. line plot

10. Albert purchased 2.4 pounds of mixed nuts for $4.79 per pound. How much did he spend in all, to the nearest cent?

a. $12.43 (b) $11.50 $4.79(2.4) = C$
c. $6.71 d. $1.99

11. What is the volume of the triangular prism?



$8(6)14 = V$

a. 336 cubic meters b. 384 cubic meters
(c) 672 cubic meters d. 724 cubic meters

12. What is the missing rule in the function table?

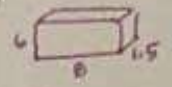
x	?
2	7
3	8
6	11
9	14
12	17

$2+5$
$3+5$
$6+5$
$9+5$
$12+5$

a. $\frac{x}{-4}$ (b) $x + 5$
c. $-4x$ d. $x - 3$

13. Mr. Addison is building a sandbox shaped like a rectangular prism. The sandbox is 8 feet long, 6 feet wide, and 1.5 feet deep. How many cubic feet of sand will the sandbox hold?

a. 15.5 cubic feet (b) 72 cubic feet
c. 105 cubic feet d. 138 cubic feet



$V = 6(8)1.5$

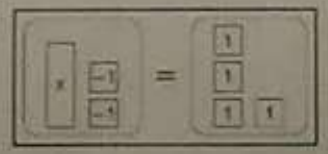
14. A carpenter makes 4 table legs for each table that he builds. Which equation represents the relationship between the number of tables built t and the number of legs made l?

(a) $l = 4t$ b. $t = 4l$
c. $l = t + 4$ d. $t = l + 4$

15. Which of the following equations represents the function graphed on the coordinate plane?

a. $y = x + 5$ b. $y = x - 1$
c. $y = 11 + x$ (d) $y = 11 - x$

16. The algebra mat below models the equation $x - 2 = 4$.



What is the solution to the equation?

(a) 6 b. 2
c. −2 d. −1

17. The table shows the number of points Anna scored this season. Find the mean number of points Anna scored.

Points Scored			
12	2	9	10
16	6	8	15
12	13	12	14

a. 9 points b. 10 points

$\frac{\text{sum of points}}{\text{\# games}} = \frac{132}{12} = 11 \text{ pts}$

Name _____ Class _____ Date _____

(c) 11 points d. 12 points

18. Julio is evaluating the expression below.

$6 + 2(9 - 4) \div 3 \times 5$

Which operation should be performed first according to the order of operations?

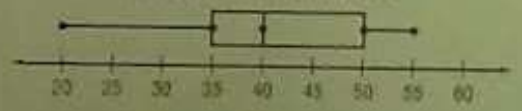
a. Add 6 and 2. b. Multiply 2 by 9.
(c) Subtract 4 from 9. d. Multiply 3 by 5.

19. Which of the following represents the decimal 0.32 written as a fraction in simplest form?

a. $\frac{32}{100}$ b. $\frac{16}{50}$
c. $\frac{17}{50}$ (d) $\frac{8}{25}$

20. The box plot shows the daily attendance at a fitness class.

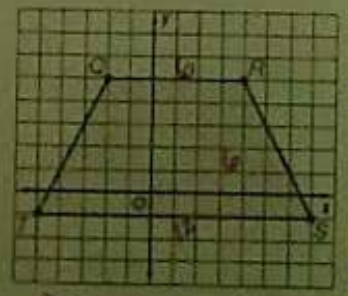
Fitness Class Attendance



What is the median of the data?

a. 55 (b) 40
c. 35 d. 20

21. What is the area of trapezoid *QRST*?



$A = \frac{(b+b)h}{2}$

$\frac{(4+12)6}{2}$

(a) 54 square units b. 68 square units

c. 76 square units d. 108 square units

22. The table below shows the type and number of vehicles in a parking lot.

Types of Cars	
Minivans	12
Sedans	28
SUV	9
Trucks	5

28 / 12

What is the ratio of sedans to minivans in simplest form?

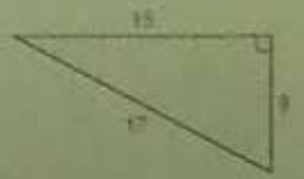
(a) 7 to 3 b. 3 to 7
c. 7 to 10 d. 10 to 3

23. Which of the following properties would you use to solve the equation?

$x + 4 = 11$ -4

a. Addition Property of Equality b. Division Property of Equality
c. Multiplication Property of Equality (d) Subtraction Property of Equality

24. What is the area of the triangle?



$\frac{15(8)}{2}$

a. 120 square units b. 75 square units
(c) 60 square units d. 40 square units

25. The list below shows the number of books read by students in Abram's class over the summer. What is the mode of the data?

3, 6, 12, 4, 3, 5, 4, 8, 4, 10, 4, 8, 7, 5, 7

(a) 4 books b. 5 books
c. 7 books d. 9 books

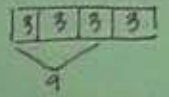
26. Which of the following coordinate pairs corresponds to point A?

Name: _____ Class: _____ Date: _____

a. (2, −3) b. (3, −2)
c. (−2, 3) d. (−3, 2)

27. The Pirates football team has played 75% of its games so far this season. If the team has played 9 games, how many games are there in the season?

a. 7 games b. 11 games
c. 12 games d. 15 games

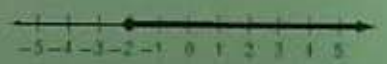


28. Which of the following best describes the center of a data set if there are outliers in the data but no big gaps in the middle of the data?

a. mean b. median
c. mode d. range

29. Which number line shows the solution to the inequality $x + 3 \leq 1$?

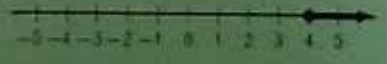
a.



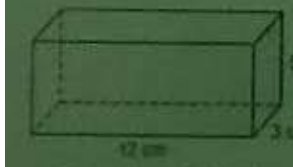
b.

c.

d.



30. What is the volume of the rectangular prism shown below?



l w h
12(3)5

a. 20 cm³ b. 75 cm³

c. 180 cm³ d. 222 cm³

31. Which of the following integers has the least absolute value?

a. −3 b. 4
c. 8 d. −12

32. Kylie surveyed several classmates about the number of states they have visited. The results are shown in the histogram.

How many of Kylie's classmates have visited more than 15 states?

a. 3 students b. 8 students
c. 12 students d. 15 students

33. What is the least common multiple of 8 and 14?

a. 56 b. 28
c. 4 d. 2

2 | 8, 14
4, 7
2 · 4 · 7 =

34. The ratio table shows the number of miles Karen can drive for 1, 2, 3, and 4 gallons of gasoline. Based on the table, how far would she be able to drive on 8 gallons of gasoline?

Gallons	1	2	3	4
Distance (mi)	30	60	90	120

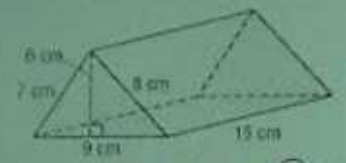
a. 30 mi b. 150 mi
c. 210 mi d. 240 mi

35. The expression rt can be used to find the distance traveled by an object that has an average speed of r over time t. How many miles will a hot air balloon travel in 2.2 hours if it travels at an average speed of 12.5 miles per hour?

a. 30.1 miles b. 27.5 miles
c. 14.7 miles d. 5.7 miles

36. What is the surface area of the triangular prism?

Name: _____ Class: _____



$P \cdot h + 2(B)$

$(9+7+8)15 + 2\left(\frac{9 \cdot 6}{2}\right)$

$24(15) + 54$

$360 + 54$

a. 468 square centimeters (b.) 414 square centimeters

c. 405 square centimeters d. 378 square centimeters

37. Which of the following symbols, when placed in the blank, makes the number sentence true?

$\frac{20}{75} \_\_\_\_ 0.\overline{26}$

75|20.

a. < (b.) =

c. < d. >

38. What value of x results in a true number sentence in the equation shown?

$2x = 16$

a. 32 b. 14

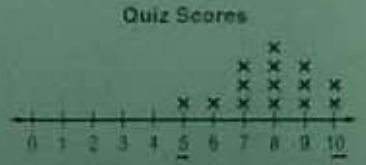
(c.) 8 d. 4

39. Which of the following expressions is equivalent to $3(4x + 1)$?

a. $7x + 4$ b. $x + 4$

c. $12x + 1$ (d.) $12x + 3$

40. The line plot shows the quiz scores of several students.

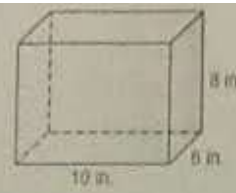


What is the range of the quiz scores?

a. 4 points (b.) 5 points

c. 7 points d. 8 points

41. Adeline is wrapping a gift for her mother in a box with the dimensions shown.



$P \cdot h + 2B$

$2(10) + 2(6) \cdot 8 + 2(10 \cdot 6)$

What is the minimum amount of wrapping paper Adeline will need to completely cover the gift box?

a. 188 square inches (b.) 376 square inches

c. 424 square inches d. 488 square inches

42. Which of the following expressions correctly uses exponents to show the prime factorization of 168?

a. $2^4 \times 3 \times 7$ b. $2^3 \times 3^2 \times 7$

c. $2^4 \times 3^2 \times 7$ (d.) $2^3 \times 3 \times 7$

$2 \mid 168$

$2 \mid 84$

$2 \mid 42$

$3 \mid 21$

7

43. Which rule best describes the relationship shown in the function table below?

Input	Output
1	3
2	6
3	9
4	12
5	15

a. subtract 2 b. add 2

c. divide by 3 (d.) multiply by 3

44. Which of the following ratios is equivalent to $\frac{5}{8}$?

a. 16 : 10 b. 5 to 13

c. $\frac{25}{44}$ (d.) 5 out of 24

45. A pancake recipe calls for $\frac{1}{3}$ cup of mix for 4 pancakes. If Beth needs to make 60 pancakes, how many cups of pancake mix will she need?

(a.) 5 cups b. $4\frac{2}{3}$ cups

c. $3\frac{1}{3}$ cups d. $\frac{1}{3}$ cup

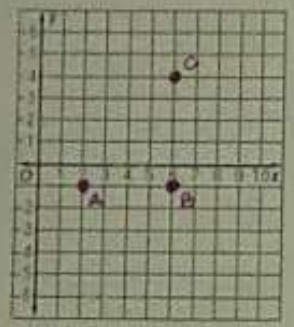
$\frac{\frac{1}{3}}{4} = \frac{?}{60}$

46. **SHORT ANSWER** Emily made 14 out of 19 shots during basketball practice. About what percent of her shots did she make? Explain your reasoning.

74%

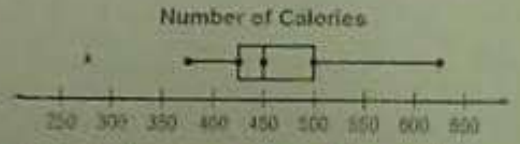
$\frac{14}{19} = \frac{?}{100}$

47. **SHORT ANSWER** Graph the figure with the vertices $A(2, -1)$, $B(6, -1)$, and $C(6, 4)$. Then classify the figure.



triangle

48. **SHORT ANSWER** The box plot below shows the number of Calories in different lunches at a restaurant. Describe the shape of the distribution using symmetry and outliers.



Most lunches are 450 calories, and range from 425-500 calories. With the outlier, the distribution is skewed to the left (fewer data on left) and is not symmetrical. The center is measured by the median and the interquartile range describes the spread.

49. **SHORT ANSWER** Jeremy can purchase a 1.2-pound package of ground beef for $4.55 or a 1.6-pound package for $6.30. Which is the better buy? Explain your reasoning.

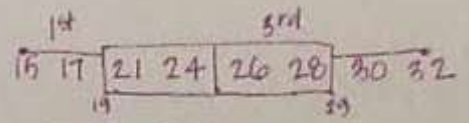
$\frac{4.55}{1.2}$ → $3.79/lb

$\frac{6.30}{1.6}$ → $3.93/lb

50. **SHORT ANSWER** The table below shows the number of canoes rented from Outdoor Adventures over the past four weekends.

Canoe Rentals			
21	32	17	24
15	30	28	26

Find the range, median, first quartile, third quartile, and interquartile range of the data.



range: 32-15 = 17
median: middle of data = 25
1st : 19
3rd : 29
interquartile range : 10

51. **SHORT ANSWER** Define a variable and write an expression to represent the following phrase.

a number increased by 5 $n + 5$

52. **SHORT ANSWER** The table below shows computer prices at an electronics store.

Computer Prices ($)			
950	620	545	810
775	1,120	905	775

sum of data / # of prices 6500/8 $812.50 (mean)

MAD

Find the mean absolute deviation to the nearest cent. Explain what this value represents.

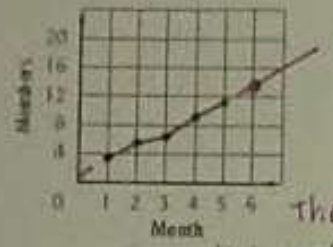
Each computer price deviates from the average mean price by $134.38.

difference from mean

950	267.5
620	192.5
775	37.5
775	37.5
810	2.5
905	92.5
960	147.5
1120	307.5

1075 / 8 = $134.38

53. **SHORT ANSWER** The line graph shows the number of members during the first few months of a photography club. Describe the data. Then predict the number of members for the sixth month.



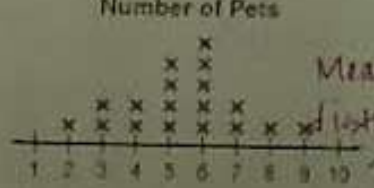
There is a steady increase of members each month. Using the best line of fit, in 6 months there will be 13 members.

54. **SHORT ANSWER** Complete the function table.

Input (x)	Output ($3x - 1$)
1	2
2	5
3	8
4	11
5	14

3(1)-1
3(2)-1

55. **SHORT ANSWER** Which measure of center would you use to describe the center of the data shown on the line plot? Explain your reasoning.



Mean is the best measure to use when your data distribution is continuous and symmetrical. It is no outliers or gaps.