Lesson: Understanding Rates and Proportional Relationships- Middle School	Name:
Teacher:	Date:

1. What is a ratio?

   a) Comparison of two quantities (Ex: 2 pencils for $1 → 2:1)
   b) Rule giving each input exactly one output
   c) Relationship where y ÷ x is always the same
   d) Value that stays the same in proportional relationships

2. What is a rate?

   a) Relationship where y ÷ x is always the same
   b) Rate for 1 of something
   c) Ratio comparing quantities with different units (Ex: 60 miles/hour)
   d) Comparison of two quantities

3. What is a unit rate?

   a) Value that stays the same in proportional relationships
   b) Rate for 1 of something (Ex: $0.50 per pencil)
   c) Comparison of two quantities
   d) Rule giving each input exactly one output

4. What is the constant of proportionality (k)?

   a) Comparison of two quantities
   b) Rule giving each input exactly one output
   c) Relationship where y ÷ x is always the same
   d) Value that stays the same in proportional relationships (y ÷ x)

5. What is a proportional relationship?

   a) Comparison of two quantities
   b) Relationship where y ÷ x is always the same; table forms a consistent pattern
   c) Rate for 1 of something
   d) Rule giving each input exactly one output

6. For the following table, find the constant of proportionality, k. Cups of Sugar (x) | Cost (y) 1 | 2.5 2 | 4.5 3 | 6.5 k = _____

   a) k = 2.0 for all pairs.
   b) k = 3.0 for all pairs.
   c) k = 2.5 (for x=1), but k is not constant for all pairs.
   d) k = 1.5 for all pairs.

7. For the following table, find the constant of proportionality, k.
   Books (x) | Price (y)
   1 | 12
   2 | 24
   3 | 36
   k = _____

   a) k = 12
   b) k = 24
   c) k = 3
   d) k = 36

8. Critical Thinking: Which student's graph represents a proportional relationship? Student A's graph was a straight line through the origin, while Student B's graph was a straight line but did NOT pass through the origin.

   a) Both students, because both graphs are straight lines.
   b) Student A, because a proportional relationship is shown by a straight line through the origin.
   c) Student B, because any straight line shows a proportional relationship.
   d) Neither student, because neither graph shows a proportional relationship.

9. A lemonade stand sells 1 cup for $2. Find k, write the equation, and calculate the cost of 8 cups. Show your work.

   a) k = 8, Equation: y = 8x, Cost of 8 cups = $64
   b) k = 1, Equation: y = x, Cost of 8 cups = $8
   c) k = 2, Equation: y = 2x, Cost of 8 cups = $16
   d) k = 4, Equation: y = 4x, Cost of 8 cups = $32

10. The points (1,3), (2,6), (3,9) form a proportional relationship. (True/False)

a) Only for some points
b) Cannot be determined
c) False
d) True

11. Every proportional relationship is also a function. (True/False)

a) False
b) Only sometimes
c) Never
d) True

12. $y = 3x + 2$ is a proportional relationship. (True/False) Explain:

a) Only for $x > 0$
b) Only when $y = 0$
c) True
d) False

13. A recipe calls for 2 cups flour to make 12 cookies. The amount of flour is directly proportional to the number of cookies. (True/False)

a) Only for some recipes
b) Cannot be determined
c) False
d) True

14. What is the equation for the cost of y movie tickets if each ticket costs $9?

a) $y = 9 + x$
b) $y = 9x$
c) $y = x \div 9$

15. Points (1,3), (2,6), (3,9): Is this relationship proportional?

a) True
b) False

16. Every proportional relationship is a function.

a) False
b) True

17. $y = 3x + 2$ is a proportional relationship.

a) False
b) True

18. Recipe: 2 cups flour for 12 cookies. Is the relationship between flour and cookies proportional?

a) True
b) False

19. For each table below, calculate k = y/x. Determine if the relationship is proportional. Explain.

b)

x	y
1	2
2	5
3	8

Is the relationship proportional? Explain your reasoning.

a) Yes, the relationship is proportional because k = y/x is not constant (2, 2.5, 2.67).
b) No, the relationship is not proportional because k = y/x is constant (2, 2, 2).
c) No, the relationship is not proportional because k = y/x is not constant (2, 2.5, 2.67).
d) Yes, the relationship is proportional because k = y/x is constant (2, 2, 2).

20. Determine whether each relation is a function. Explain your reasoning. a) { (1,2), (2,4), (3,6) }

a) No, it is not a function because some inputs have more than one output.
b) Yes, it is a function because each input has exactly one output.
c) No, it is not a function because there are repeated pairs.
d) No, it is not a function because some outputs have more than one input.

21. Determine whether each relation is a function. Explain your reasoning. b) { (1,2), (2,4), (1,5) }

a) Yes, it is a function because each input has a unique output.
b) No, it is not a function because the input 1 has two different outputs (2 and 5).
c) No, it is not a function because the outputs are not unique.
d) Yes, it is a function because all outputs are different.

22. Determine whether each relation is a function. Explain your reasoning. c) y = 3x

a) Yes, it is a function because for every x there is exactly one y.
b) No, it is not a function because some x values have more than one y value.
c) No, it is not a function because some y values have more than one x value.
d) No, it is not a function because x and y are not related.

23.

Sam reads 90 pages of a book in 2 hours.

Assume they maintain a constant speed.

Enter the number of minutes it takes Sam to read 1 hour.

24. Match the following

Unit Rate	a comparison of TWO quantities
Proportion	a ratio with TWO DIFFERENT UNITS
Ratio	a ratio with a quantity of ONE
Rate	two equal RATIOS

25. Israel and Daniel are both swimming laps in the same swimming pool. Israel can swim 4 laps in 6 minutes. Daniel can swim 6 laps in 12 minutes. Based on these rates, which statement is NOT true?

(a) _____

Choose from the below words

Daniel Can Swim More Laps Than Israel	Daniel Can Swim 3 Laps In 6 Minutes.
Israel Can Swim 2 Laps In 3 Minutes.	Israel Can Swim More Laps Than Daniel

26. Israel and Daniel are both swimming laps in the same swimming pool. Israel can swim 4 laps in 6 minutes. Daniel can swim 6 laps in 12 minutes. Based on these rates, which statement is NOT true?

Choose from the below words

Daniel Can Swim More Laps Than Israel	Daniel Can Swim 3 Laps In 6 Minutes.
Israel Can Swim 2 Laps In 3 Minutes.	Israel Can Swim More Laps Than Daniel

27. (a) _____ a comparison of two quantities that uses division

Choose from the below words

Ratio	Rate	Percent	Multiplicative Reasoning

28.

Time (minutes)	Shirts Folded
2	9
6	27
8	36

Which statement is true? There may be more than one.

a) It takes 4.5 minutes to fold 1 shirt.

b) The ratio of minutes to shirts is 2:9

c) In 10 minutes, you could fold 45 shirts.

d) In 1 minute, you could fold 4.5 shirts.

e) The ratio of shirts to minutes is 2:9

29. In the table below, there is a relationship between x and y.

x	y
7	21
10	30
14	?

What is the missing value in the table?

a) 42

b) 41

c) 34

d) 39

30. a.  b. 

You add the same numbers of pennies and dimes to the coins shown. Is the new ratio of pennies to dimes proportional to the original ratio of pennies to dimes?

Ans. _____

Answer Keys

1. c) Comparison of two quantities (Ex: 2 pencils for $1 → 2:1)
2. c) Ratio comparing quantities with different units (Ex: 60 miles/hour)
3. a) Rate for 1 of something (Ex: $0.50 per pencil)
4. c) Value that stays the same in proportional relationships (y ÷ x)
5. b) Relationship where y ÷ x is always the same; table forms a consistent pattern
6. b) k = 2.5 (for x=1), but k is not constant for all pairs.
7. d) k = 12
8. c) Student A, because a proportional relationship is shown by a straight line through the origin.
9. a) k = 2, Equation: y = 2x, Cost of 8 cups = $16
10. d) True
11. d) True
12. a) False
13. d) True
14. b) y = 9x
15. b) True
16. b) True
17. b) False
18. a) True
19. a) No, the relationship is not proportional because k = y/x is not constant (2, 2.5, 2.67).
20. a) Yes, it is a function because each input has exactly one output.
21. a) No, it is not a function because the input 1 has two different outputs (2 and 5).
22. c) Yes, it is a function because for every x there is exactly one y.
23. 45
24. Ratio - a comparison of TWO quantities , Rate - a ratio with TWO DIFFERENT UNITS , Unit Rate - a ratio with a quantity of ONE , Proportion - two equal RATIOS
25. Daniel can swim more laps than Israel
26.
27. Ratio

28. c) In 10 minutes, you could fold 45 shirts.
, b) In 1 minute, you could fold 4.5 shirts.
, e) The ratio of minutes to shirts is 2:9

29. a) 42

30. No