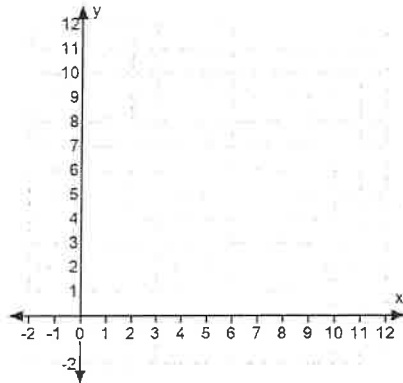# Graphing Proportional Relationships

Determine if the relationship shown in the table is proportional. Then graph each point on the coordinate plane, and connect with a straight line – continue your line through your points through the y axis.

1.

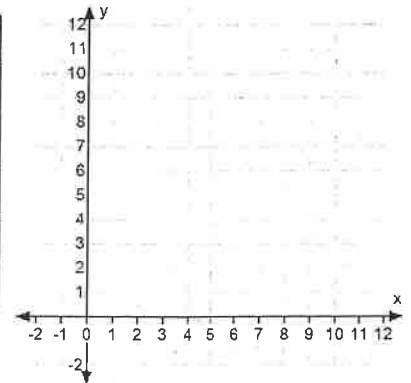| X | Y |
|---|---|
| 2 | 4 |
| 3 | 6 |
| 4 | 8 |
| 5 | 10 |
| 6 | 12 |

Proportional: yes   no

Constant of Proportionality:

Equation:

2.

| X | Y |
|---|---|
| 1 | 6 |
| 2 | 8 |
| 3 | 10 |
| 4 | 12 |
| 5 | 14 |

Proportional: yes   no

Constant of Proportionality:

Equation:

3.

| X | Y |
|---|---|
| 3 | 2 |
| 6 | 4 |
| 9 | 6 |
| 12 | 8 |
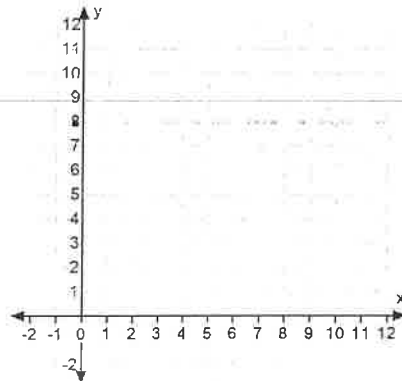
Proportional: yes   no

Constant of Proportionality:

Equation:

4.

| X | Y |
|---|---|
| 3 | 1 |
| 4 | 2 |
| 5 | 3 |
| 6 | 4 |
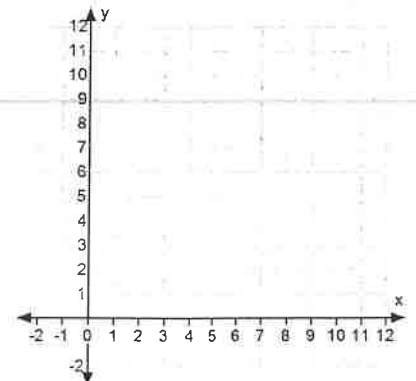
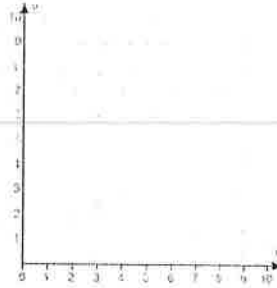Proportional: yes   no

Constant of Proportionality:

Equation:

# What do you notice about the graphs of the proportional relationships?

The graph of a proportional relationship is a _____ _____ that passes through the _____.

# Graphing Proportional Relationships

1. The cost of renting video games from Games, Inc. is shown in the table. Determine whether the cost is proportional to the number of games rented by graphing on the coordinate plane. Explain your reasoning.

| Number of Games | Cost ($) |
|---|---|
| 1 | 3 |
| 2 | 5 |
| 3 | 7 |
| 4 | 9 |

2. The slowest mammal on the earth is the tree sloth. It moves at a rate of 6 feet per minute. Determine whether the number of feet the sloth moves is proportional to the number of minutes it moves by graphing on the coordinate plane. Explain your reasoning.

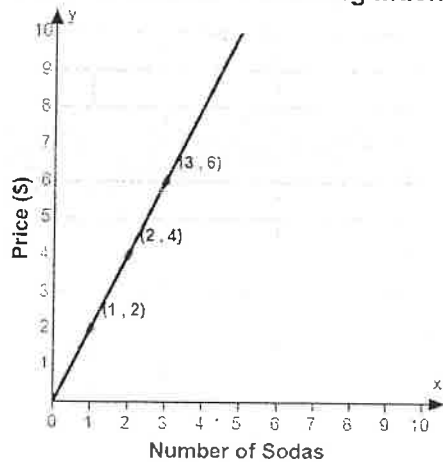| Time (min) | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| Distance (feet) | 0 | 6 | 12 | 18 | 24 |
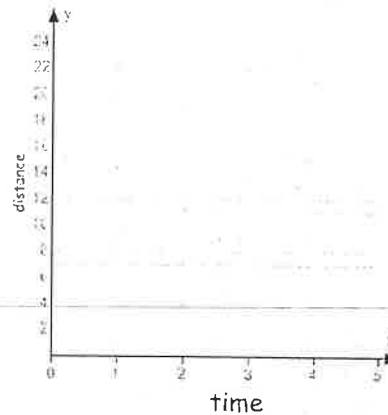
**Identifying the Constant of Proportionality (unit rate) given a graph:**
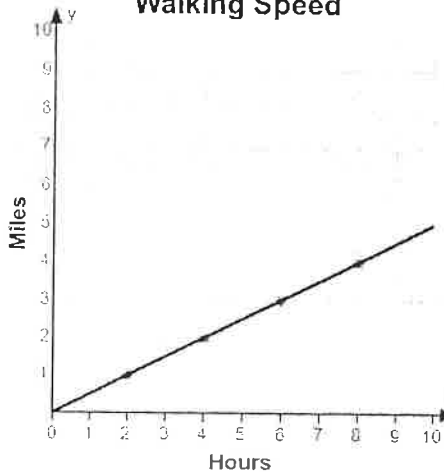
The constant of proportionality is always the point _____, where $k$ is the constant of proportionality. Additionally, you can find the constant of proportionality by finding the ratio of _____ for any point on the

_____.

Let's try…identify the constant of proportionality in each graph below, and write the equation.
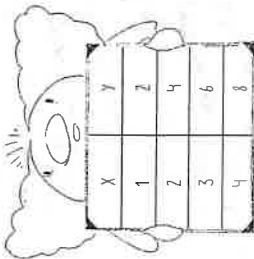
1. **Price of Soda in a Vending Machine**

(3, 6)
(2, 4)
(1, 2)

Price ($) / Number of Sodas

2. **Walking Speed**

Miles / Hours

Name _____

Date _____

# Proportional Relationships
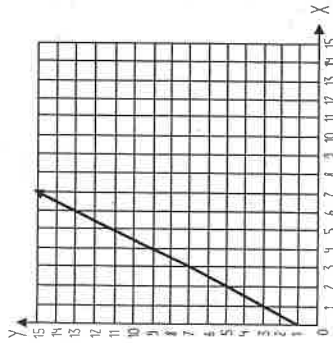
## PART 1

In each problem, identify whether the relationship between X and Y is proportional. Explain why or why not.
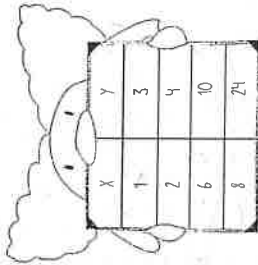
**1.**

| X | Y |
|---|---|
| 1 | 2 |
| 2 | 4 |
| 3 | 6 |
| 4 | 8 |

_____
_____
_____

**2.**

| X | Y |
|---|---|
| 1 | 3 |
| 2 | 4 |
| 6 | 10 |
| 8 | 24 |

_____
_____
_____

**3.**

_____
_____
_____

**4.**

_____
_____
_____

---

Name _____

Date _____

## PART 2

**1.** A shower uses the same amount of water each minute it is on. The table shows the length of showers and the amount of water used.

| Shower Length (minutes) | Water Used (gallons) |
|---|---|
| 4 | 8 |
| 8 | 16 |
| 10 | 20 |
| 14 | 28 |
| 20 | 40 |

**a.** What is the constant of proportionality in the relationship between shower length and gallons of water used? Explain how you found your answer.

**b.** What is the unit rate of water used per minute? How does this relate to your answer to Part A?

**c.** Explain how to figure out how many gallons of water are used for any shower length.

**d.** Call the length of the shower "s" and the amount of water used "w." Identify the independent variable and the dependent variable. Then, write an equation to represent the relationship between **s** and **w**.

Name _____

Date _____

2. The table shows the relationship between the number of children at a party and the number of balloons a clown gives out. Complete the table, and then answer A-D.

| Number of Children | Number of Balloons |
|---|---|
| 3 | 9 |
| 6 | |
| | 21 |
| | 27 |
| 11 | 33 |
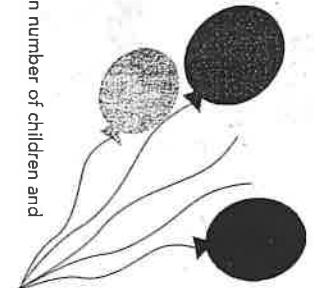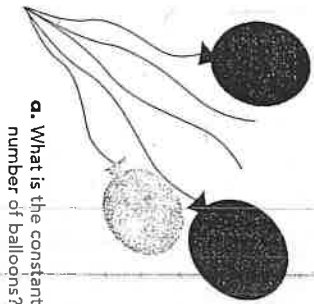
a. What is the constant of proportionality in the relationship between number of children and number of balloons? Explain how you found your answer.

b. What is the unit rate of balloons per child? How does this relate to your answer to Part A?

c. Explain how to figure out the number of balloons that are given out for any number of children at a party.

d. Call the number of children "c" and the number of balloons given out "b." Identify the independent variable and the dependent variable. Then, write an equation to represent the relationship between c and b.

Name _____

Date _____

3. The graph shows the amount of time Daveed spends reading and the number of pages he reads.
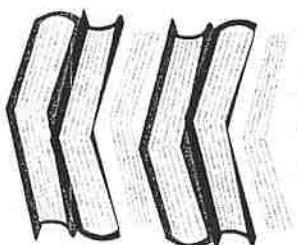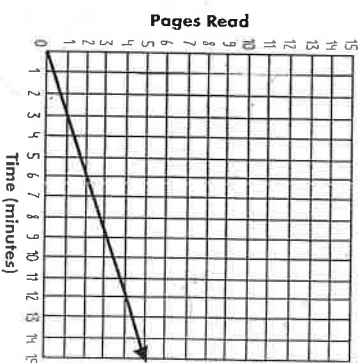
Pages Read

(graph axes: Pages Read 1–15 vertical; Time (minutes) 1–15 horizontal)

Time (minutes)

a. What is the constant of proportionality in the relationship between time reading and pages read? Explain how you found your answer.

b. What is Daveed's unit rate for reading? How does this relate to your answer to Part A?

c. Explain what the point (6,2) represents.

d. Explain what the point (12,4) represents.

e. Call the time spent reading "t" and the pages read "p." Identify the independent variable and the dependent variable. Then, write an equation to represent the relationship between t and p.
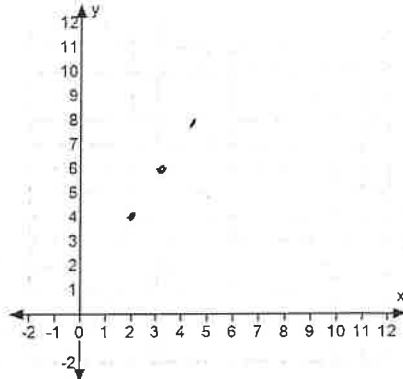
Determine if the relationship shown in the table is proportional. Then graph each point on the coordinate plane, and connect with a straight line – continue your line through your points through the y axis.

1.

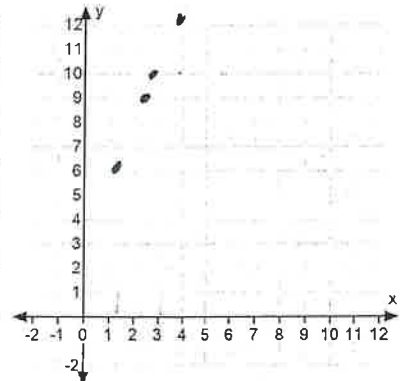| X | Y |
|---|---|
| 2 | 4 |
| 3 | 6 |
| 4 | 8 |
| 5 | 10 |
| 6 | 12 |



Proportional: (yes) no

Constant of Proportionality: $\frac{2}{1}$

Equation: $y = 2x$

2.

| X | Y |
|---|---|
| 1 | 6 |
| 2 | 8 |
| 3 | 10 |
| 4 | 12 |
| 5 | 14 |



Proportional: yes (no)

Constant of Proportionality:

Equation:

3.

| X | Y |
|---|---|
| 3 | 2 |
| 6 | 4 |
| 9 | 6 |
| 12 | 8 |
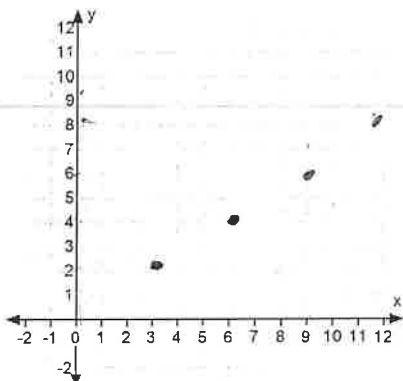


Proportional: (yes) no

Constant of Proportionality: $\frac{2}{3}$

Equation: $y = \frac{2}{3}x$

4.

| X | Y |
|---|---|
| 3 | 1 |
| 4 | 2 |
| 5 | 3 |
| 6 | 4 |
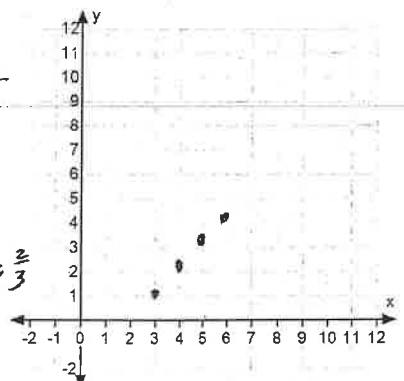


Proportional: yes (no)

Constant of Proportionality:

Equation:

# What do you notice about the graphs of the proportional relationships?

The graph of a proportional relationship is a ___straight___ ___line___
that passes through the ___origin___.

# Graphing Proportional Relationships

1. The cost of renting video games from Games, Inc. is shown in the table. Determine whether the cost is proportional to the number of games rented by graphing on the coordinate plane. Explain your reasoning.

| Number of Games | Cost ($) |
|---|---|
| 1 +2 | 3 |
| 2 +3 | 5 |
| 3 +4 | 7 |
| 4 +5 | 9 |
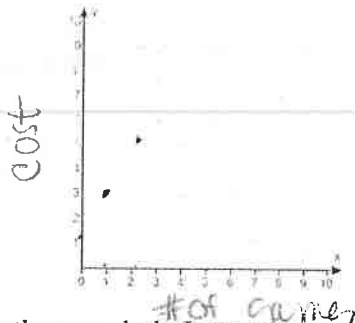
not proportional doesn't pass through origin

cost

# of games

2. The slowest mammal on the earth is the tree sloth. It moves at a rate of 6 feet per minute. Determine whether the number of feet the sloth moves is proportional to the number of minutes it moves by graphing on the coordinate plane. Explain your reasoning.

| Time (min) | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| Distance (feet) | 0 | 6 | 12 | 18 | 24 |

×6  ×6  ×6  ×6

$\frac{0}{0}, \frac{6}{1}, \frac{12}{2}$

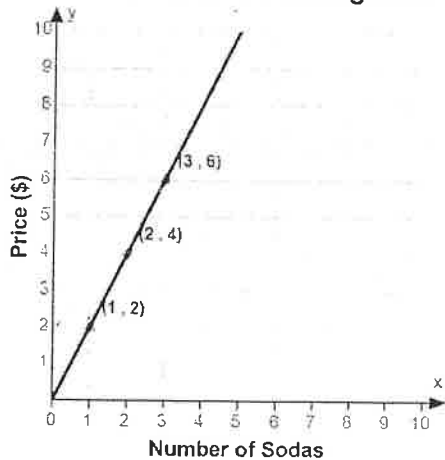yes, a straight line that passes through the origin
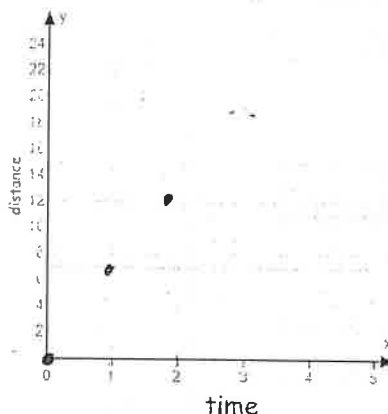
distance

time

**Identifying the Constant of Proportionality (unit rate) given a graph:**

The constant of proportionality is always the point ___(1, k)___, where k is the constant of proportionality. Additionally, you can find the constant of proportionality by finding the ratio of $\frac{y}{x}$ for any point on the graph (line).
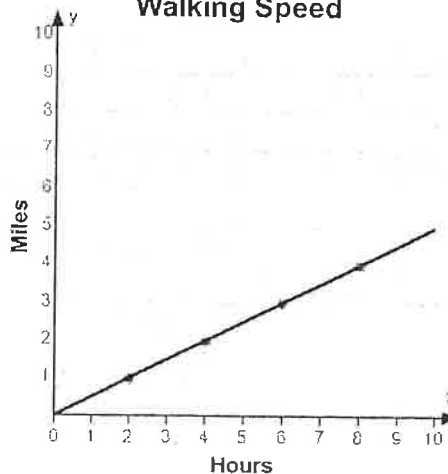
Let's try... identify the constant of proportionality in each graph below, and write the equation.

1. **Price of Soda in a Vending Machine**

Price ($)

(3, 6)

(2, 4)

(1, 2)

Number of Sodas

$C.O.P. = \frac{y}{x} = \frac{2}{1}$ or $y = 2x$

2. **Walking Speed**
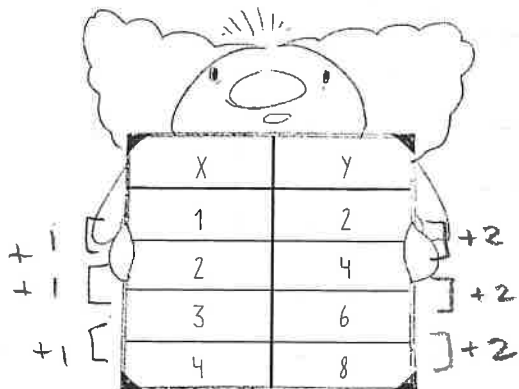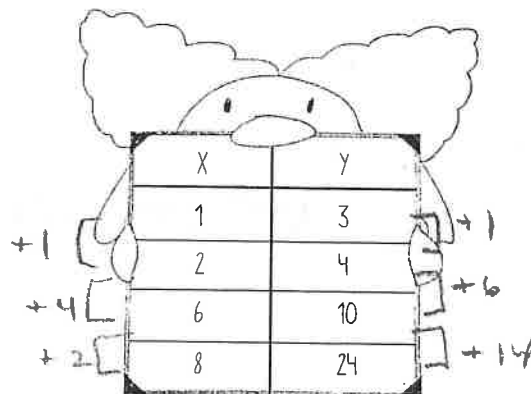
Miles

Hours

$C.O.P. = \frac{y}{x} = \frac{1}{2}$

$y = \frac{1}{2}x$

**Flocabulary**

Name _____ *Key* _____

Date _____

# Proportional Relationships

## PART 1

In each problem, identify whether the relationship between X and Y is proportional. Explain why or why not.

| X | Y |
|---|---|
| 1 | 2 |
| 2 | 4 |
| 3 | 6 |
| 4 | 8 |

+1, +1, +1   +2, +2, +2

**1.** Yes, there is a constant of proportionality $\frac{\Delta y}{\Delta x} = \frac{2}{1} = 2$

| X | Y |
|---|---|
| 1 | 3 |
| 2 | 4 |
| 6 | 10 |
| 8 | 24 |

+1, +4, +2   +1, +6, +14

**2.** No, no constant of proportionality
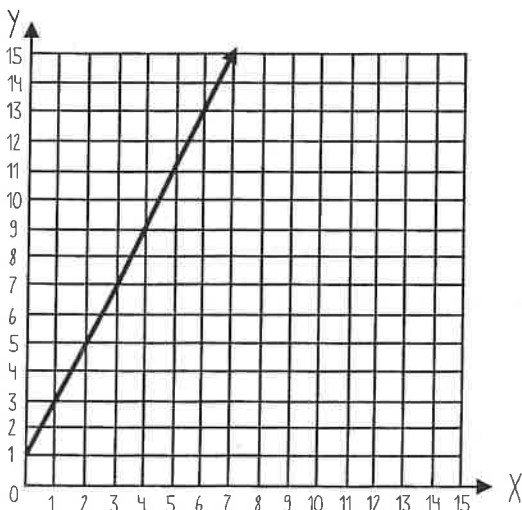
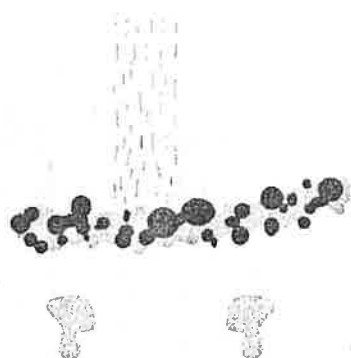**3.** No, doesn't pass through origin
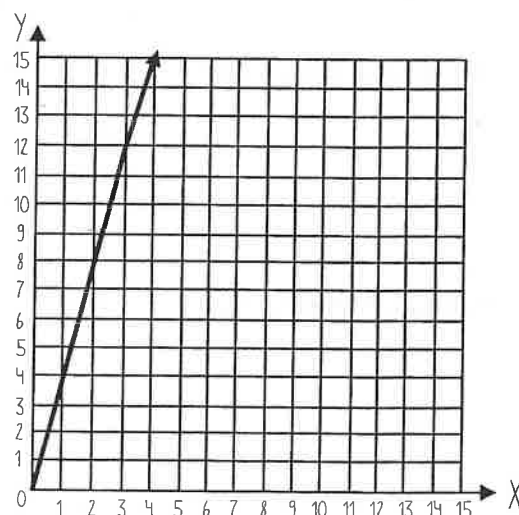
**4.** Yes - straight line that passes through the origin
c.o.p. = $\frac{4}{1}$ or 4

page · 1

## PART 2

**1.** A shower uses the same amount of water each minute it is on. The table shows the length of showers and the amount of water used.

| Shower Length (minutes) | Water Used (gallons) |
|---|---|
| 4 | 8 |
| 8 | 16 |
| 10 | 20 |
| 14 | 28 |
| 20 | 40 |

**a.** What is the constant of proportionality in the relationship between shower length and gallons of water used? Explain how you found your answer.

pattern x 2

$\frac{8}{4} = 2$

$\frac{40}{20} = 2$

$\frac{2\ gal}{1\ min}$

**b.** What is the unit rate of water used per minute? How does this relate to your answer to Part A?

$\frac{2\ gal}{1\ min}$

**c.** Explain how to figure out how many gallons of water are used for any shower length.

$y = 2x$

**d.** Call the length of the shower "s" and the amount of water used "w." Identify the independent variable and the dependent variable. Then, write an equation to represent the relationship between **s** and **w**.
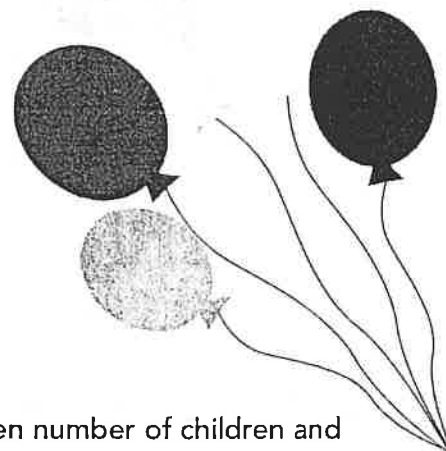
$w = 2s$

minutes = ind

water = dep.

**2.** The table shows the relationship between the number of children at a party and the number of balloons a clown gives out. Complete the table, and then answer A-D.
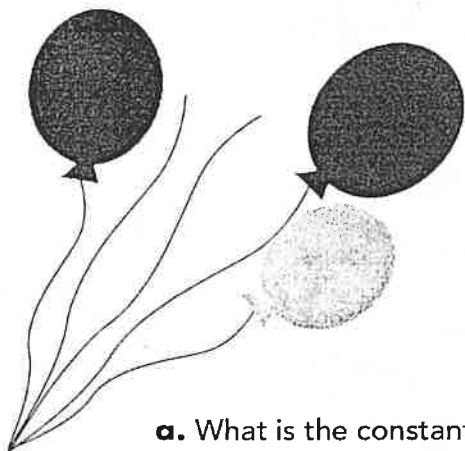
| Number of Children | Number of Balloons |
|---|---|
| 3 | 9 |
| 6 | 18 |
| 7 | 21 |
| 9 | 27 |
| 11 | 33 |

**a.** What is the constant of proportionality in the relationship between number of children and number of balloons? Explain how you found your answer.

$$\frac{9}{3} = 3 \quad \text{or} \quad \frac{3}{1}$$

**b.** What is the unit rate of balloons per child? How does this relate to your answer to Part A?

$\frac{3}{1}$ because each child gets 3 balloons = C.O.P.

**c.** Explain how to figure out the number of balloons that are given out for any number of children at a party.
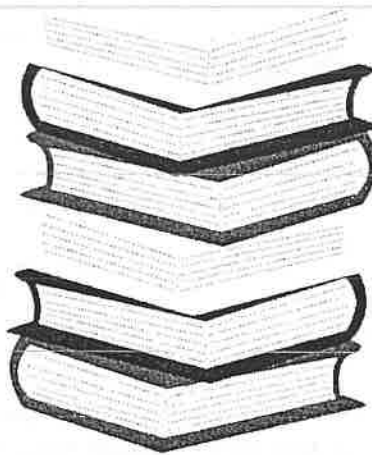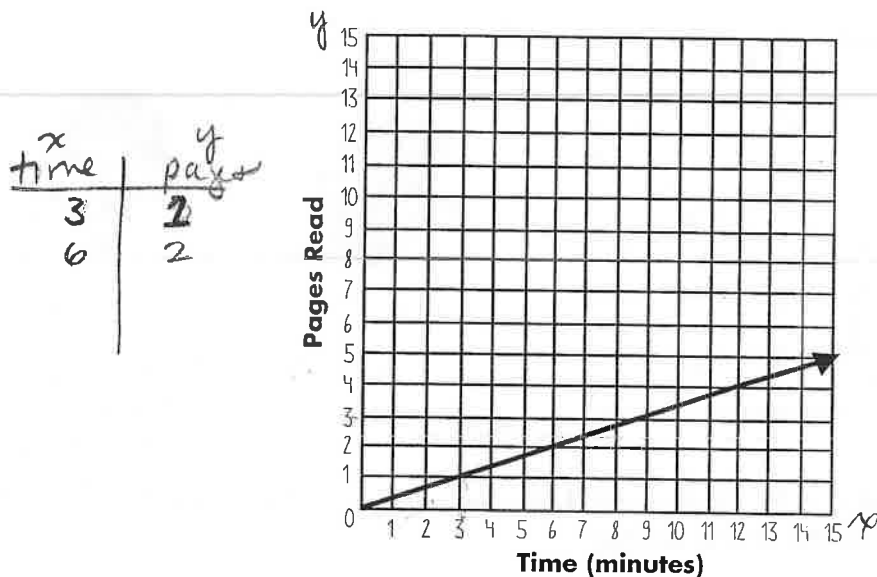
$y = 3x$   mult. 3 × the # of kids

**d.** Call the number of children "c" and the number of balloons given out "b." Identify the independent variable and the dependent variable. Then, write an equation to represent the relationship between **c** and **b.**

$b = 3c$

#of b depends on c  #of child

**3.** The graph shows the amount of time Daveed spends reading and the number of pages he reads.

| $\overset{x}{time}$ | $\overset{y}{pages}$ |
|---|---|
| 3 | 1 |
| 6 | 2 |

Pages Read / Time (minutes)

**a.** What is the constant of proportionality in the relationship between time reading and pages read? Explain how you found your answer.

$\frac{1\ page}{3\ min}$     looked at the graph   $\frac{6\ min}{2\ pages}$

**b.** What is Daveed's unit rate for reading? How does this relate to your answer to Part A?

He reads 1 pg per Minute = .33 page per min
It takes 3 min to read 1 page.

**c.** Explain what the point (6,2) represents.

Daveed reads 6 pgs in 2 minutes

**d.** Explain what the point (12,4) represents.

Daveed reads 12 pg in 4 min

**e.** Call the time spent reading "t" and the pages read "p." Identify the independent variable and the dependent variable. Then, write an equation to represent the relationship between **t** and **p**.

$p = 3t$          p depends on time

pages