

Algebra Readiness Materials Part 1

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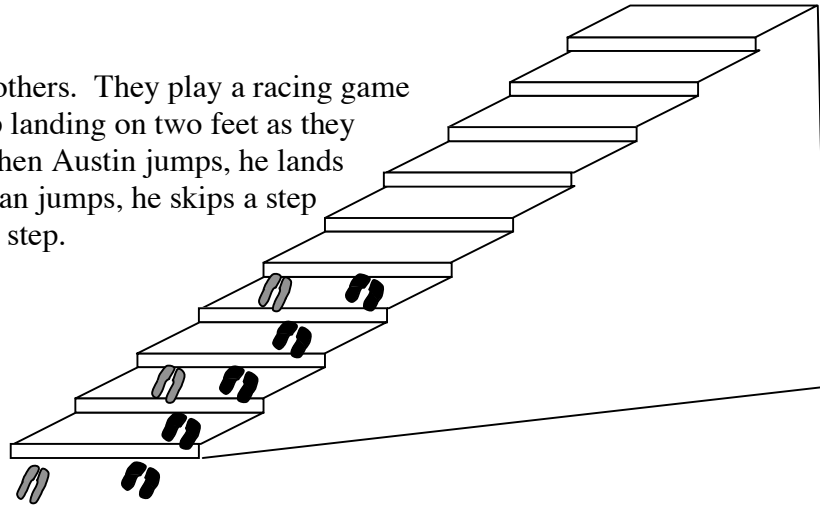
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Problem of the Month

First Rate

Level A

Dylan and Austin are brothers. They play a racing game up the stairs. They jump landing on two feet as they race up the staircase. When Austin jumps, he lands on each step. When Dylan jumps, he skips a step and lands on every other step.



1. Who has to take more jumps to get to the top of the stairs?
2. When Dylan jumps up the staircase, how many jumps does he make?
3. When Austin jumps up the staircase, how many jumps does he make?
4. If Austin and Dylan each took 5 jumps, who would be farthest up the stairs?
5. At the end of the race who took less jumps?
6. Who do you think won the race? Explain your answer.

Level B

Tom and Diane start to race. Tom took 4 seconds to run 6 yards. Diane ran 5 yards in 3 seconds.



If they continued to run at the same speeds, who would get to 30 yards first? Show how you figured out.

Who runs faster? How can you compare their speeds?

Level C

The Environmental Club at school attends an annual community clean-up event. They have recycling games. A team is assigned an area of land that is scattered with litter. The goal is for a pair of participants to clean up the area in the fastest time possible.



Tammy, working alone, could clean one-half the area in one hour. Her partner Melissa, working alone, could clean one-third of the area in one hour. During the contest when they work together, how long will it take them to clean the area? Explain how you found your solution.

Division

This problem gives you the chance to:

- relate a given division calculation to appropriate practical situations
-

When you calculate $100 \div 6$ using a calculator, the result is 16.666667.

This result can be used to give a **sensible** answer to all the following questions except one.

1. Write down the sensible answers and find the question that cannot be answered using this result.

- a. How much does each person pay when 6 people share the cost of a meal costing \$100?

- b. 100 children each need a pencil. Pencils are sold in packs of 6. How many packs are needed?

- c. What is the cost per gram of shampoo costing \$6 for 100 grams?

- d. How many CDs costing \$6 each can be bought for \$100?

- e. What is the average distance per day, to the nearest mile, travelled by a hiker on the Appalachian Trail, who covers 100 miles in 6 days?

2. Write another question, together with its sensible answer, that can be answered using $100 \div 6$.

Factors

This problem gives you the chance to:

- work with factors of numbers up to 30
-

A factor of a number divides into the number exactly.

This table shows all the factors of most of the numbers up to 30.

| Number | Factors | Number of factors |
|--------|-------------------|-------------------|
| 1 | 1 | 1 |
| 2 | 1, 2 | 2 |
| 3 | 1, 3 | 2 |
| 4 | 1, 2, 4 | 3 |
| 5 | 1, 5 | 2 |
| 6 | 1, 2, 3, 6 | 4 |
| 7 | 1, 7 | 2 |
| 8 | 1, 2, 4, 8 | 4 |
| 9 | 1, 3, 9 | 3 |
| 10 | 1, 2, 5, 10 | 4 |
| 11 | 1, 11 | 2 |
| 12 | 1, 2, 3, 4, 6, 12 | 6 |
| 13 | 1, 13 | 2 |
| 14 | 1, 2, 7, 14 | 4 |
| 15 | 1, 3, 5, 15 | 4 |

| Number | Factors | Number of factors |
|--------|---------------------------|-------------------|
| 16 | 1, 2, 4, 8, 16 | 5 |
| 17 | 1, 17 | 2 |
| 18 | 1, 2, 3, 6, 9, 18 | 6 |
| 19 | 1, 19 | 2 |
| 20 | 1, 2, 4, 5, 10, 20 | 6 |
| 21 | 1, 3, 7, 21 | 4 |
| 22 | 1, 2, 11, 22 | 4 |
| 23 | 1, 23 | 2 |
| 24 | 1, 2, 3, 4, 6, 8, 12, 24 | 8 |
| 25 | 1, 5, 25 | 3 |
| 26 | 1, 2, 13, 26 | 4 |
| 27 | ___ ___ ___ ___ | 4 |
| 28 | ___ ___ ___ ___ ___ ___ | 6 |
| 29 | ___ ___ | 2 |
| 30 | 1, 2, 3, 5, 6, 10, 15, 30 | 8 |

1. Write the factors of the numbers 27, 28, and 29 in the table.

2. The numbers 1 and 4 have an odd number of factors.

a. Write down all the numbers up to 30 that have an odd number of factors.

1, 4, _____, _____, _____

b. Complete this sentence:

All the _____ numbers up to 30 have an odd number of factors.

3. The number 10 has two odd factors (1 and 5).

It also has two even factors (2 and 10).

The number 18 has three odd factors (1, 3 and 9).

It also has three even factors (2, 6 and 10).

a. Write down all the numbers up to 30 that have an equal number of odd and even factors.

2, 6, 10, _____, 18, _____, _____, _____

b. Describe two patterns you can see in the above sequence of numbers.

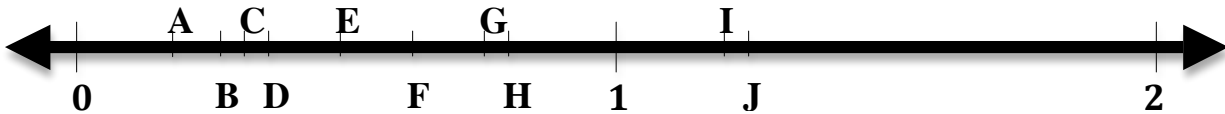
Performance Task

Fraction Match

Tracy had some cards with numbers on them.

| | | | |
|---------------|----------------|---------------|---------------|
| $\frac{2}{5}$ | $\frac{4}{12}$ | 25% | 0.33 |
| $\frac{5}{8}$ | $\frac{8}{6}$ | 1.25 | $\frac{3}{4}$ |
| $\frac{4}{8}$ | 0.67 | $\frac{6}{8}$ | 37.5% |

1. Tracy drew the number line below and labeled the points on the number line. Match each of the number cards to a point on the line. A point may have more than one card match.



Match numbers in the cards to the points.

A. _____ B. _____ C. _____ D. _____ E. _____

F. _____ G. _____ H. _____ I. _____ J. _____

2. Tracy made a puzzle about fraction operations using the same set of fraction cards. Fill in the numbers from the fraction cards to make true number sentences. You may use the same card more than once.

$$\boxed{} + \boxed{\frac{3}{4}} = \boxed{1.25}$$

$$\boxed{} \times \boxed{} = \boxed{25\%}$$

$$\boxed{} - \boxed{} = \boxed{}$$

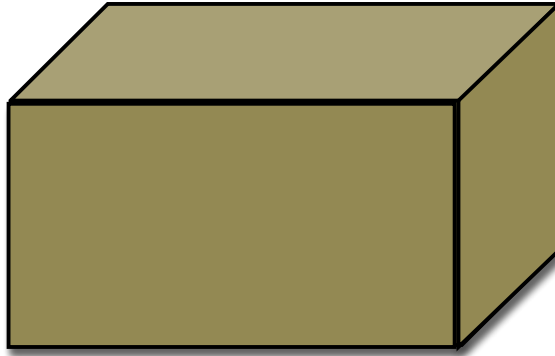
$$\boxed{} \div \boxed{\frac{4}{12}} = \boxed{\frac{6}{8}} + \boxed{}$$

Show how you figured it out.

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Performance Task
Unfolding a Box

Avani went to the grocery store and brought home a cardboard box that was covered with a sealed top.



Two end faces of the box are squares. The area of the face on either end is 64 square inches.

1. What is the length of the side of a square face? _____
2. The length at the longer side of the other faces is one and a half the length of the square face.
What is the area of one of the other rectangular faces of the box? _____
Show how you figured it out.
3. How much can the box hold? Explain your answer.

4. Avani wanted to cut the sides of the box and create one big piece of cardboard that would lie flat. How many sides would she need to cut to make a flat piece of cardboard that still had every face connected together?

5. Draw the flat sheet of cardboard and label the sides that were cut.

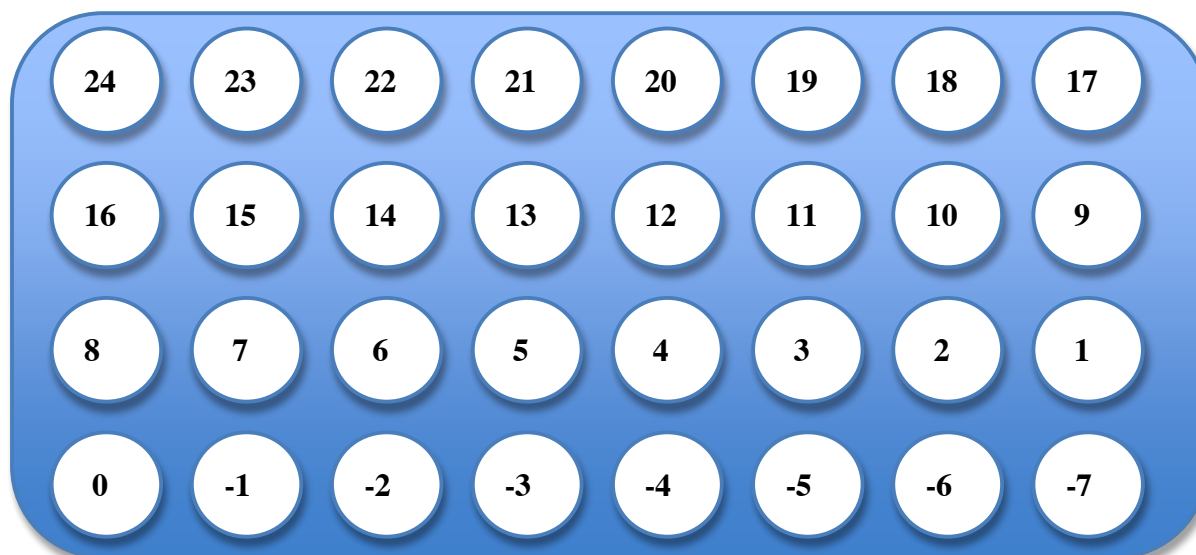
6. What is the total area of the cardboard? Show how you figured it out.

Hotel Elevator

MAC Assessment Task

A high-rise hotel is built over an underground parking garage. There is an elevator that takes guests from the lowest floor of the garage to the highest floor in the hotel. The hotel uses integers to label the floors. Zero is ground level. Negative numbers are the floors in the underground parking garage. Positive numbers are the floors of the hotel.

The elevator has the following button pad that controls which floor the elevator can travel to:



1. How many floors are there in the underground garage? _____ floors
2. A guest gets on the elevator at the 24th floor. How many floors must the person travel to get to her car parked on the floor -7?
_____ floors

Write a number sentence using integers to represent the distance she traveled.

3. A guest gets out of his car on floor -6 and travels 15 floors. What floor will he be at when the elevator stops?

Write a number sentence using integers to represent the situation.

4. Ms. Fiat gets out of her car on floor -2 and gets off at floor -7. How far did she travel?

_____ floors

Write a number sentence using integers to represent the situation.

The elevator starts at ground level. Over a fifteen minute time period the elevator stops at the following floors:

-4, 18, 7, -2, -6, 23, 2 and 6

5. What was the average distance the elevator traveled between floors?

_____ floors

Show how you figured it out.

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It is Just an Expression

MAC Assessment Task

Jesse is playing a game with her brother. She writes a mathematical statement and shows her brother two cards with different mathematical equations. She writes the following statement and shows two cards.

There are five times as many sixth graders as eighth graders here.

$$5 \cdot S = E$$

$$5 \cdot E = S$$

1. Which equation matches the statement? _____
2. Write a new statement for the other card.

Jesse writes a second mathematical statement and shows her brother two cards with different mathematical equations.

Fifteen less than Jesse's age is 6 more than Tanya's age.

$$15 - J = 6 + T$$

$$J - 15 = T + 6$$

3. Which equation matches the statement? _____

4. Write a new statement for the other card.

Jesse writes the following statement.

The number of students in the class (x) will be divided into teams of 4, except one team will have 5, resulting in 8 teams in all.

5. Write a mathematical equation for the statement above.

6. Given the equation:

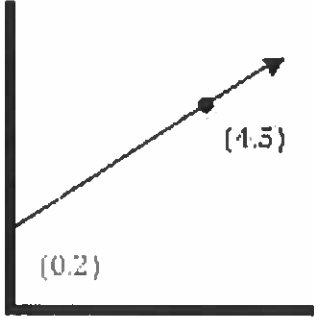
$$\frac{x - 5}{4} = 8$$

Write a statement that matches the equation.

Is It Proportional?

MAC Assessment Task

The chart lists situations that can be modeled with mathematics. Write an equation to model each situation. Determine whether the situation is directly proportional or not directly proportional.

| Situation | Write an equation using variables x and y to represent the situation. | Is the equation directly proportional? |
|---|---|--|
| Tom is twice as old as his sister. His sister is x years old. In five years how old will Tom be? | | |
| Tammy is baking cookies. She knows she needs x cups of flour to make a regular batch. She wants to triple the number of cookies. How many cups of flour does she need? | | |
| Trevor has averaged 64 miles per hour to get from home to the ocean in 30 minutes. If he slowed down by x miles per hour, how long would it take him to drive back home the same route? | | |
| Teri joined a dance team. It costs \$20 to join and \$5 each time she goes to class. How much does it cost to be on the team for x classes? | | |
|  <p>What is the equation of the line?</p> | | |

2. Write a situation that is proportional.

World Sport Leagues

Assessment Task

Dylan looked up the ten most popular sports leagues in the world in 2011. He found this table on an internet site.

| League | Sport | Country | Teams | Games | Total attendance |
|------------------------------|---------------------------|------------------------|-------|-------|------------------|
| Australian Football League | Australian rules football | Australia | 17 | 196 | 7,146,604 |
| Bundesliga | Association football | Germany | 18 | 306 | 13,057,899 |
| Canadian Football League | Canadian football | Canada | 8 | 72 | 2,000,552 |
| La Liga | Association football | Spain | 20 | 380 | 11,039,808 |
| Major League Baseball | Baseball | United States / Canada | 30 | 2,420 | 73,451,522 |
| National Football League | American football | United States | 32 | 256 | 17,252,949 |
| Nippon Professional Baseball | Baseball | Japan | 12 | 846 | 21,679,596 |
| Premier League | Association football | England | 20 | 380 | 13,407,540 |
| Primera División de México | Association football | Mexico | 18 | 306 | 7,905,999 |
| Serie A | Association football | Italy | 20 | 380 | 9,131,780 |

1. Which league has the greatest attendance? _____

How many people attended the games? _____

2. What is the mean number of teams in these ten most popular leagues?

Show how you figured it out. _____

3. Dylan and his friend Scott argued which measure would best represent the typical number of games played in a league.
Dylan thought it was the median. Scott thought it was the mode.

Who do you agree with? _____

Find that measure _____

Explain why it could represent the typical number of games played in the league.

4. Which league has the best attendance per game? _____
Explain how you figured it out.

5. What is the best average total attendance for a team in a league? _____
Explain how you figured it out.