Table of Contents

Introduction

Which fence is longer? Whose heart beats faster? Which food is less expensive? Who travels the furthest? Which collection of coins is worth more? Which shape has a larger area? Which sale is a better deal? Which fraction is larger? Which jar holds more water when full? Which food has less fat calories? Who makes the greater profit? Which event lasted longer? Comparisons provide a motivating backdrop to perform mathematical calculations in a wide range of contexts.

This collection of 150 problems asks students in Grades 4 and 5 to perform calculations to make a comparison and come to a decision. The Dare to Compare format recasts more traditional math problems from a single calculation to two or more calculations to come to a final conclusion. Rather than compute a single sale price, the student computes two sale prices to determine which sale is a better deal. Instead of calculating the number of fat calories in a single food item, the student calculates the number of fat calories in two separate food items to determine which has the least amount of fat calories.

The problems are intended to be non-routine but accessible. The solution process is open-ended, allowing students to create mathematical reasoning and to decide how to quantify in order to formulate a conclusion. The one guiding rule for all problems is that the conclusions are to be supported with calculations and concrete answers. To determine which food item is less expensive in question 1, calculate the price of the sandwich and the salad. To decide whose phone call lasts longer in question 2, compute the call times for Teddy and Lana. To conclude who makes more money in question 3, calculate Andrew's earnings and Bobby's earnings.

Comparisons are especially suited for problems involving fractions, rates, ratios, and proportional thinking. However, they can serve as a backdrop for any mathematical topic – geometry, graphing, patterns, elementary algebraic reasoning, probability, counting, measurement, number operations, and logic. So the comparisons are rich in both mathematical content and critical thinking. Each problem is accompanied by one or more hints and a complete solution (many problems have multiple solution methods, and we make no claim to provide the best method). Calculators are not needed, nor should they be allowed, for any of the questions. For some questions the compared quantities are equal rather than one being greater than the other.

25. Who travels the longest distance? Who travels the shortest distance?

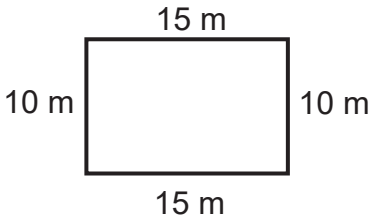
Tanya walks 4 feet every second for 60 seconds.

Kevin cycles 30 feet every second for 7 seconds.

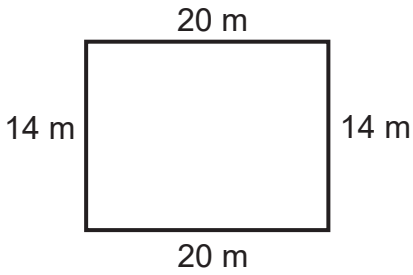
Amanda runs 9 feet every second for 25 seconds.

26. Joanne and Remy each build a wooden fence around their rectangular vegetable garden. Whose fence costs more?

Joanne's fence costs $7 per meter.



Remy's fence costs $5 per meter.



27. In the list below, each person's heart beats at a constant rate. Whose heart will have the most beats in 1 minute? Whose heart will have the fewest beats in 1 minute?

- Adam's heart beats 25 times in 20 seconds.
- Rachel's heart beats 160 times in 120 seconds.
- Brett's heart beats 18 times in 15 seconds.

37. Which is a longer amount of time?

a. 450 minutes or 7 hours

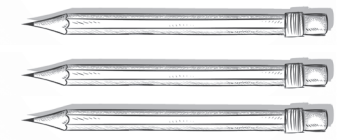
b. 1,000 seconds or 20 minutes

1 hour = 60 minutes
1 minute = 60 seconds

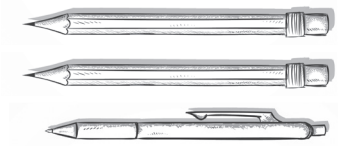
c. 190 minutes or $3\frac{1}{3}$ hours

d. 4,000 seconds or 1 hour

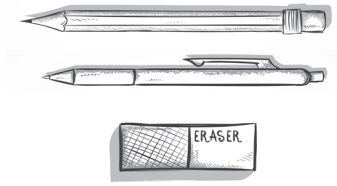
38. What is the price of a pencil? What is the price of a pen? What is the price of an eraser?



3 pencils cost 60¢



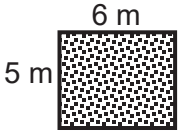
2 pencils and
1 pen cost 75¢



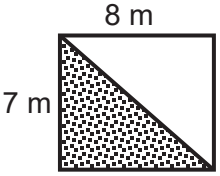
1 pencil, 1 pen, and
1 eraser cost $1.15

39. Which shaded region has the largest area? Which shaded region has the smallest area?

A



B



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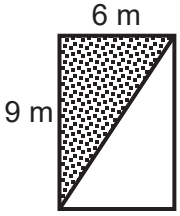

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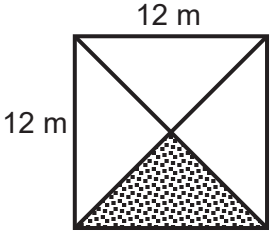
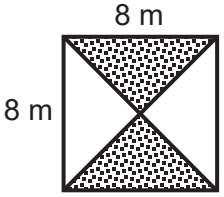


E



103. Whose car has more gas left after their trip?

Flora's car starts with 11 gallons of gas and she drives 150 miles.

Flora's car travels 30 miles for every gallon of gas.

Mason's car starts with 14 gallons of gas and he drives 175 miles.

Mason's car travels 25 miles for every gallon of gas.

104. Whose meal has more calories?

Jonah's meal
- 8 ounces of chicken
- 3 ounces of rice
- 6 ounces of beans

Camilla's meal
- 6 ounces of chicken
- 6 ounces of rice
- 5 ounces of beans

Nutrition Information
- 4 ounces of chicken has 200 calories
- 6 ounces of rice has 240 calories
- 2 ounces of beans has 60 calories

105. Whose jar holds more water when full?

Nora's jar is 2/3 full, but if she adds 6 more cups it will be completely full.

Robin's jar is 3/4 full, but if she adds 5 more cups it will be completely full.