

Classwork Set 18

Multiplying and Dividing Decimals

These are the sections you must complete in this set:

- ✓ Topic Questions
 - ✓ Problem Solving
 - ✓ Challenge Questions
-

Decimal place values, addition and subtraction were previously covered in set 6.

Multiplying and **dividing** decimal numbers is similar to performing these operations for whole numbers, except consideration must be given to the number of decimal places in the product.

When **multiplying** decimals:

- Disregard decimal points and multiply the factors in the same way as for whole numbers.
- Count the number of decimal places from each factor.
- The number of decimal places in the product must equal the total number from the factors.

When **dividing** decimals:

- Remember that the first number is the **dividend** and the second number is the **divisor**.
- Shift the decimal point until there are no decimal places in the divisor.
- Move the decimal point in the dividend the same number of places as the divisor.
- Now divide as per normal, leaving the decimal point in the same position.

Example: 4.62×3.8 ← 2 decimal places + 1 decimal place

$$462 \times 38 = 17\,556$$

$$\therefore 4.62 \times 3.8 = 17.556$$

Total of 3 decimal places

Example: $3.45 \div 0.3$ ← 3.45 is the dividend and 0.3 is the divisor

$$= 34.5 \div 3$$

← Move decimal points 1 place to the right

$$= 11.5$$

Topic Questions

1. Calculate the following:

- | | |
|--------------------------|--------------------------|
| (a) 4.63×2 | <i>Answer: 9.26</i> |
| (b) 1.032×8 | <i>Answer: 8.256</i> |
| (c) 4.19×0.6 | <i>Answer: 2.514</i> |
| (d) 1.63×9.8 | <i>Answer: 15.974</i> |
| (e) 1.498×2.74 | <i>Answer: 4.10452</i> |
| (f) 19.36×5.469 | <i>Answer: 105.87984</i> |

2. Calculate the following:

- | | |
|-----------------------|-----------------------|
| (a) $1.28 \div 2$ | <i>Answer: 0.64</i> |
| (b) $24.64 \div 8$ | <i>Answer: 3.08</i> |
| (c) $1.28 \div 0.4$ | <i>Answer: 3.2</i> |
| (d) $2.5 \div 1.25$ | <i>Answer: 2</i> |
| (e) $9.72 \div 2.7$ | <i>Answer: 3.6</i> |
| (f) $25.28 \div 1.25$ | <i>Answer: 20.224</i> |

3. Calculate the following:

- | | |
|---------------------------------|-----------------------|
| (a) $4.98 - 1.4 \times 1.7$ | <i>Answer: 2.6</i> |
| (b) $2.638 - 0.75 \div 1.25$ | <i>Answer: 2.038</i> |
| (c) $3.6 \times 10 \div 2.5$ | <i>Answer: 14.4</i> |
| (d) $1.32 \times 5.57 \div 0.2$ | <i>Answer: 36.762</i> |

4. Every day a snail can crawl 2.75 metres. How far will it crawl in a week ?

Answer: 19.25 metres

5. Cassie buys 6 chocolate costing \$1.85 each. How much will she pay in total ?

Answer: \$11.10

6. When Harry walks, the length of his step is 0.8 metres. How many steps will he take if he walks 100 metres ?

Answer: 125 steps

Problem Solving

1. Ewen buys 64 pavers to build a small path. If each paver weighs 2.15 kg, what is the total weight of all the pavers ?

Answer: 137.6 kg

2. Grant bought 0.8 kg of beans. If the beans were priced at \$6.90 per kg, find the total cost.

Answer: \$5.52

3. Find the cost of 3.5 kg of steak priced at \$22.90 per kg.

Answer: \$80.15

4. An oil burner runs for 6.5 hours and used 1.4 litres of oil per hour. What was the total amount of oil used ?

Answer: 9.1 litres

5. There are 1.6 kilometres in one mile. How many miles are there in 112 kms ?

Answer: 70 miles

6. Darcy earns \$15.50 per hour at his job. If he was paid \$286.75 for last week, how many hours did Darcy work last week ?

Answer: 18.5 hours

7. In a bicycle race, a team of 4 riders has cycled a total of 2460 kms. If the race was completed over 6 days, how many kilometres on average did each rider complete per day ?

Answer: 102.5 km

8. An ice-cream scoop contains 0.08 litres of ice-cream. How many scoops can a vendor sell from a 20 litre container ?

Answer: 250 scoops

Challenge Questions

1. Bartholomew is paid \$8.40 an hour to clean cars. He gets paid 1.5 times his normal wages for overtime (over 40 hours per week). If he works 55.5 hours in one week, how much money does he earn ?

Answer: \$531.30

2. Wyatt has \$73.85. He wants to divide this amount evenly between himself and four of his friends. How much should each person get ?

Answer: \$14.77

3. Henry purchased 46.6 litres of petrol for his car at a total cost of \$61.48. What was the cost of petrol per litre, rounded to the nearest cent ?

Answer: \$1.32

4. Find the total cost of this food: 4 kgs of steak at \$23.89 per kg, 4 dozen eggs at \$6.95 per dozen, 2 litres of milk at \$1.99 per litre and 3 loaves bread at \$2.79 each.

Answer: \$135.71

5. It takes the moon on average of 27.32 days to circle the earth. In a leap year, how many times, to the nearest whole number, will the moon circle the earth ?

Answer: 13 (before rounding 13.397)

6. Kelly plans to fence in her yard. The fencing company charges \$43.25 per metre for fencing materials and \$35.75 an hour per worker. Kelly needs 76 metres of fencing. If 3 men work a total of 6 hours each installing the fence, how much will she need to pay in total ?

Answer: \$3 930.50

Classwork Set 19

Solving Equations

These are the sections you must complete in this set:

- ✓ **Topic Questions**
 - ✓ **Problem Solving**
 - ✓ **Challenge Questions**
-

Algebra is exactly the same as arithmetic except that it uses letters or symbols instead of numbers. These letters and symbols are called **pronumerals** and we use these pronumerals in equations and expressions. Algebra is the process that we use to create and solve these equations. Using the standard rules of arithmetic, we find the value of the pronumeral that makes the equation true.

An **equation** is a mathematical statement that contains the equal “=” sign, stating that two expressions are equal in value. An **expression** is simply a statement without the equality sign.

Example: $3a + b$ This is an **expression**.
 $3a + b = 4$ This is an **equation**.

The process of **solving equations** in algebra involves the use of **inverse operations**. In arithmetic, every operation has an inverse, for example, subtraction is the inverse of addition, division is the inverse of multiplication and so on. When solving equations, follow these simple rules:

- The equation must remain balanced or equal at all times. Any change to the left-hand side of the equation must be matched with a similar change to the right-hand side.
- Isolate the pronumeral by using inverse operations to remove any numbers.

Example: Solve the equation $x + 3 = 7$

To find the value of x that makes this equation true, we use the inverse of addition, namely subtraction, to remove the 3 from the left-hand side.

To keep the equation balanced, we must do the same to the right-hand side.

Therefore $x + 3 = 7$ becomes

$x + 3 - 3 = 7 - 3$ \longleftarrow Subtract 3 from both sides of the equation.

So $x = 4$.

Topic Questions

1. Write an equation to represent the following statements:

- | | |
|--|--------------------|
| (a) A certain number plus 10 is equal to 15. | $x + 10 = 15$ |
| (b) I think of a number, subtract 3 and the answer is 12. | $x - 3 = 12$ |
| (c) A number divided by 4 is equal to 9. | $x \div 4 = 9$ |
| (d) I think of a number, times it by 4 and the result is 24. | $4x = 24$ |
| (e) Four pencils and two sharpeners cost \$6. | $4p + 2s = \$6.00$ |

2. Solve the following equations:

- | | |
|-----------------------|-----------|
| (a) $x + 13 = 20$ | $x = 7$ |
| (b) $a - 8 = 17$ | $a = 25$ |
| (c) $5x = 40$ | $x = 8$ |
| (d) $n \div 3 = 5$ | $n = 15$ |
| (e) $\frac{x}{4} = 3$ | $x = 12$ |
| (f) $3x + 2 = 20$ | $x = 6$ |
| (g) $2a - 5 = 9$ | $a = 7$ |
| (h) $10x = 25$ | $x = 2.5$ |

3. Write an algebraic expression for each of the following statements:

- | | |
|--|----------------------------------|
| (a) Subtract 5 from the sum of $2x$ and $7y$. | $(2x + 7y) - 5 = 2x + 7y - 5$ |
| (b) The product of $3a$ and $4b$. | $3a \times 4b = 12ab$ |
| (c) Add 10 to the sum of $6x$ and $3y$. | $(6x + 3y) + 10 = 6x + 3y + 10$ |
| (d) 10 more than the product of $4a$ and $2x$. | $(4a \times 2x) + 10 = 8ax + 10$ |
| (e) 5 more than one-third of a number x . | $(x \div 3) + 5$ |
| (f) The sum of 3 consecutive odd integers where x is the smallest of these integers. | $x + (x + 2) + (x + 4) = 3x + 6$ |
| (g) John has \$100. He bought n books at \$10 each. How much money is left? | $\$100 - \$10n$ |

Problem Solving

1. Solve the following equations:

- | | |
|-----------------------|-----------|
| (a) $x + 3 = 8$ | $x = 5$ |
| (b) $a - 6 = 5$ | $a = 11$ |
| (c) $-6x = 18$ | $x = -3$ |
| (d) $n \div 12 = 6$ | $n = 72$ |
| (e) $\frac{x}{5} = 4$ | $x = 20$ |
| (f) $7x + 14 = 70$ | $x = 8$ |
| (g) $3a - 3 = 15$ | $a = 6$ |
| (h) $5x = 23$ | $x = 4.6$ |

2. The sum of three consecutive odd integers is 171. Find the integers.

Answer: 55, 57, 59

3. Sam went to the fair with his parents. The cost for admission to the fair was \$68 in total. If the cost of Sam's ticket was \$17, what was the price for an adult ticket ?

Answer: \$25.50

4. Find four consecutive whole numbers whose sum is 114.

Answer: 27, 28, 29, 30

5. Jack's brother is 14 years older than him. In six years' time, his brother will be twice as old as him. How old is Jack now ?

Answer: Jack is 8 years old now.

6. Ben is twice as old as Belinda. Five years ago, the sum of their ages was 92. How old is Belinda now ?

Answer: Belinda 34 years old now.

Challenge Questions

1. Find two consecutive odd integers such that the sum of the smaller integer and twice the larger integer is 85.

Answer: 27 and 29

2. When a number is halved and 8 is added to the result, the answer is 54. Find the number.

Answer: 92

3. The numerator of a fraction is four less than the denominator. If one is added to both the numerator and the denominator, the fraction becomes $\frac{1}{2}$. Find the original fraction.

Answer: $\frac{3}{7}$

4. A farmer had some cows and chickens. He counted 70 heads and 176 legs. How many cows and chickens are there on the farm ?

Answer: 18 cows and 52 chickens

5. Karen's present weight is 8 kg less than her weight a year ago. If her weight at the time was $\frac{7}{6}$ of her present weight, what is her present weight ?

Answer: 48 kg

6. Working alone, Pauline can complete a job in 2 hours, while Anne can do the same job in 3 hours. How long does it take the two women to complete the job together ?

Answer: 1.2 hours = 1 hour 12 minutes

7. Peter has three times as many tokens as Philip. If Peter gives 9 tokens to Philip, Peter will be left with 6 more tokens than Philip. Find the total number of tokens that the boys have.

Answer: 48 tokens in total. Peter starts with 36 and Philip starts with 12.

Classwork Set 20

Speed, Distance and Time

These are the sections you must complete in this set:

- ✓ Topic Questions
- ✓ Problem Solving
- ✓ Challenge Questions

Speed is a measure of how quickly an object moves from one place to another. It is equal to the **distance** travelled for the journey divided by the **time** taken for the journey.

- To find the average **speed**, use the formula $Speed = \frac{Distance}{Time}$
- To find the **distance**, use the formula $Distance = Speed \times Time$
- To find the **time** taken, use the formula $Time = \frac{Distance}{Speed}$

Ensure that the units are consistent with each other for this formula. For example, if the units for distance are given in kilometres (km), and time in hours (h), then the speed should be given as kilometres per hour (km/h). If the distance is instead given in metres (m), and the time in seconds (s), the speed must be given as metres per second (m/s).

Example: Find the average speed of a car that travels 25 kms in 30 minutes.

$$S = \frac{D}{T} = \frac{25 \text{ kms}}{0.5 \text{ hour}} = 25 \div 0.5 = 25 \div \frac{1}{2} = 25 \times \frac{2}{1} = 50 \text{ km/h.}$$

Example: Find the distance flown by a plane travelling at 750 km/h for 4 hours 20 minutes.

$$D = S \times T = 750 \text{ km/h} \times 4 \frac{1}{3} \text{ hours} = 750 \times \frac{13}{3} = 250 \times 13 = 3 \text{ 250 kms.}$$

Example: Convert the speed 20 metres per second into kilometres per hour.

$$\begin{aligned} 20 \text{ metres / second} &= 1 \text{ 200 metres / minute} && \text{(multiply by 60)} \\ &= 72 \text{ 000 metres / hour} && \text{(multiply by 60)} \\ &= 72 \text{ kilometres / hour.} && \text{(divide by 1000)} \end{aligned}$$

$$\therefore 20 \text{ m/s} = 72 \text{ km/h.}$$

Topic Questions

1. A train takes 20 minutes to travel 24 km. Find its average speed in km/h.

Answer: 72 km/h

2. Peter cycles at a speed of 15 km/h. He leaves his house at 09:45 a.m. and arrives at his destination at 11:00 a.m. How far does he travel ?

Answer: 18.75 km

3. A train travelled at 120 km/h for 420 km. If it left station A at 06:50 a.m., at what time did it arrive at station B ?

Answer: 10:20 a.m.

4. Convert the following units:

(a) $25 \text{ m/s} = \text{km/h}$ *Answer: 90 km/h*

(b) $45 \text{ km/h} = \text{m/s}$ *Answer: 12.5 m/s*

(c) $99 \text{ km/h} = \text{m/s}$ *Answer: 27.5 m/s*

(d) $15 \text{ m/s} = \text{cm/min}$ *Answer: 90 000 cm/min*

(e) $54 \text{ km/h} = \text{m/s}$ *Answer: 15 m/s*

5. A train travels 210 km in 2 hours. How long will it take the same train to travel 525 km at the same speed ?

Answer: 5 hours

6. Peter travelled for 3 hours from town A to town B at a speed of 80 km/h. How long would it take him to travel the same distance if he increased his speed by 25% ?

Answer: 2 hours 24 mins

7. Sam cycles for a total of 8 hours. The first 3 hours he cycles at an average speed of 25 km/h and for the remainder of his trip he cycles at an average speed of 21 km/h. What is Peter's average speed for the entire trip ?

Answer: 22.5 km/h

Problem Solving

1. Tommy travels at 80 km/h for 420 km. How much further could he have travelled in the same amount of time if he increased his speed to 100 km/h ?

Answer: 105 km

2. A plane left Singapore at 23:30 on Monday and travelled at an average speed of 810 km/h to reach London at 12:55 on Tuesday. How long was the flight in hours and minutes ?

Answer: 13 hours 25 mins

3. For the flight in the previous question, calculate the distance from Singapore to London.

Answer: 10 867.5 km

4. A car is travelling at a constant speed of 81 km/h on a freeway.

- (a) Convert this speed to metres per second

Answer: 22.5 m/s

- (b) Find the distance the car travels in 15 minutes.

Answer: 20.25 km

- (c) How many minutes does the car take to travel 135 km ?

Answer: 100 mins

5. Tommy and Jimmy both leave at 09:00 to travel from town A to town B. Tommy travels at 80 km/h and reaches town B at 11:30. Jimmy had already arrived 30 minutes before Tommy. How fast was Jimmy travelling ?

Answer: 100 km/h

6. A boat crosses a 900 metre lake in 3 minutes. What is the boat's average speed in km/h ?

Answer: 18 km/h

Challenge Questions

1. Bill and Amy want to ride their bikes from their home to school which is 14.4 kms away. It takes Amy 40 minutes to arrive at school. Bill arrives 20 minutes after Amy. How much faster, in meters per second, is Amy's average speed for the entire trip ?

Answer: 2 m/s

2. A van left town A and travelled at an average speed of 72 km/h. Twenty minutes later, a car started from town A and travelled along the same route as the van. If the car caught up with the van after a distance of 78 km, find the average speed of the car.

Answer: 104 km/h

3. In school, Adam and Ben run around a 400 metre track in opposite directions. Their speeds are 6 m/s and 5 m/s respectively. How many times do they pass each other in 15 minutes ?

Answer: 24

4. It took a train 50 seconds to completely pass through a tunnel that was 1000 m long. It took the same train, travelling at the same speed, 75 seconds to completely go over a bridge that was 1625 m long. How fast was the train travelling in km/h ?

Answer: 90 km/h

5. How long, in metres, was the train ?

Answer: 250 m

6. Mr. Welsh drives at a constant speed of 108 km/h from his home to his office every morning. He drives at a constant speed of 72 km/h for the return trip from the office to his home. What is the average speed for the round-trip ?

Answer: 86.4 km/h