

Year 5 and Year 6 Multiplication and Division, Unit 1 (56862)

Additional teacher instructions for practice sheets

These notes indicate which practice sheets are most appropriate for which groups.

Day 1 Y5 Common multiples and factors Sheet 1

Working towards ARE / Working at ARE / Greater Depth

Children answer as many questions as they can.

Working towards ARE answer first 6 in each section.

Greater Depth – can children find the lowest common multiples and highest common factors each time?

Day 1 Y6 Abundant numbers

All children refer to Resource sheet 2.

Day 2 Y5 Square and cube numbers Sheet 1

Working towards ARE

Day 2 Y5 Square and cube numbers Sheet 2

Working at ARE / Greater Depth

Day 2 Y6 Goldbach's conjecture Sheet 3

Working towards ARE / Working at ARE / Greater Depth

Day 3 Y5/Y6 Scale bedroom at Hogwarts Castle Sheet 1

Y5 Working towards ARE / Working at ARE / Greater Depth

Y6 Working towards ARE

Day 3 Y6 Scale bedroom at Hogwarts Castle Sheet 2

Working at ARE / Greater Depth

Day 4 Y5 Rates Sheet 1

Working towards ARE / Working at ARE

Day 4 Y5/Y6 Rates Sheet 2

Y5 Greater Depth

Y6 Working towards ARE / Working at ARE / Greater Depth

Y6 Working at ARE and Greater Depth complete the Challenge.

Common multiples and factors

Sheet 1

Write a common multiple of each pair of numbers

1. 2 and 5
2. 3 and 4
3. 5 and 6
4. 5 and 10
5. 6 and 9
6. 5 and 12
7. 6 and 8
8. 7 and 8
9. 3 and 5
10. 8 and 12

Write a list of factors each pair of numbers have in common

1. 12 and 15
2. 15 and 30
3. 20 and 30
4. 16 and 24
5. 15 and 21
6. 18 and 24
7. 42 and 56
8. 24 and 30
9. 32 and 48
10. 24 and 36

Challenge

Use dice or place value cards to create two 2-digit numbers.
List any factors that these numbers have in common (other than 1).

Square and cube numbers

Sheet 1

1. Ring all the square numbers. **Clue:** There are nine!

9	25	30	4	21	45	81	100
3	36	16	49	13	64	52	15

2. $2^3 = 2 \times 2 \times 2 =$
 $3^3 = 3 \times 3 \times 3 =$
 $4^3 =$
 $5^3 =$

Challenge

Calculate square numbers up to 15^2 .

Square and cube numbers

Sheet 2

Carry on marking this person's homework.

Write the correct answers for any wrong answers at the side.

1. $2^2 = 4$ ✓
2. $3^2 = 6$ ✗ $3^2 = 3 \times 3 = 9$
3. $5^2 = 25$
4. $4^2 = 8$
5. $10^2 = 100$
6. $9^2 = 18$
7. $7^2 = 48$
8. $6^2 = 36$
9. $8^2 = 64$
10. $2^3 = 8$
11. $3^3 = 9$
12. $5^3 = 125$
13. $4^3 = 64$
14. $7^3 = 21$
15. $8^3 = 512$
16. $10^3 = 100$
17. $6^3 = 216$
18. $9^3 = 629$

Challenge

Calculate square numbers up to 20^2 .

Goldbach's conjecture

Sheet 3

Christian Goldbach (1690 – 1764) thought that every even number greater than 4 could be made by adding two prime numbers, but he couldn't prove it. This is known as Goldbach's conjecture.

Centuries later, mathematicians all over the world are still trying to prove or disprove this conjecture.

List the prime numbers up to 50: 2, 3, 5, ...

Find pairs of prime numbers which add to make even numbers in the table. Do you think Goldbach's conjecture might be true or not?

Even numbers	Pairs of prime numbers	Even numbers	Pairs of prime numbers
6	3 + 3	22	
8		24	
10		26	
12		28	
14		30	
16		32	
18		34	
20		36	

Now investigate other even numbers. Try some larger 2-digit numbers and some 3-digit numbers too!

Scale bedroom at Hogwarts Castle

Sheet 1

Calculate the dimensions of everything in the model bedroom.
Each measurement needs to be $\frac{1}{10}$ of the life-size measurements.

Item	Life size dimensions	Model dimensions
Single bed	90cm wide, 2m long, 60cm high	
Owl's cage	90cm tall, 40cm wide, 40cm deep	
Box of potions	30cm by 20cm by 20cm	
Desk	80cm tall, 1.2m wide, 70cm deep	
Spells book	50cm tall, 30cm wide, 10cm deep	
Wardrobe	80cm wide, 1.8m tall, 50cm deep	
Chest of drawers	80cm wide, 80cm tall, 40cm deep	
Bedside drawers	50cm wide, 40cm deep, 60cm tall	

Challenge

Think of three more items in the bedroom, give an estimate of their life size dimensions and the corresponding model dimensions.

Scale bedroom at Hogwarts Castle

Sheet 2

Calculate the dimensions of everything in the model bedroom.
Each measurement needs to be $\frac{1}{20}$ of the life-size measurements.
What strategy will you use to divide numbers by 20?

Item	Life size dimensions	Model dimensions
Single bed	90cm wide, 2m long, 60cm high	
Owl's cage	90cm tall, 40cm wide, 40cm deep	
Box of potions	30cm by 20cm by 20cm	
Desk	80cm tall, 1.2m wide, 70cm deep	
Spells book	50cm tall, 30cm wide, 10cm deep	
Wardrobe	80cm wide, 1.8m tall, 50cm deep	
Chest of drawers	80cm wide, 80cm tall, 40cm deep	
Bedside drawers	50cm wide, 40cm deep, 60cm tall	

Challenge

Think of three more items in the bedroom, give an estimate of their life size dimensions and the corresponding model dimensions.

Rates

Sheet 1

1. A space hopper champion can hop 3 metres every second.
How far can be hopped in 30 seconds? In a minute?
2. A record holder can pop 5 balloons every second with a nail.
How many balloons will be popped in 30 seconds? In a minute?
3. A food record challenger can eat a sugared doughnut in 30 seconds.
How many could be eaten in 5 minutes? In 10 minutes?
4. A professional typist can type 60 words per minute.
How many words could be typed in 30 seconds? In 10 minutes?
5. A tea lover drinks tea at the rate of 9 cups a day.
How many cups are drunk in a week? A month? A year?!
6. A book lover reads 20 pages an hour.
How long will it take to finish a 240 page book?
7. A person working in a supermarket is paid £6.50 per hour.
How much will they earn in 8 hours?
8. A hot air balloon is gently descending at the rate of 20 metres per minute.
If it is 600m above the ground, how long will it take to reach the ground?

Rates

Sheet 2

Look at the following world records.

With a partner to calculate the rate they had to aim for to make these records, e.g. number of balloons per second, or metres hopped per second.

1. The record for the number of sugared doughnuts eaten without licking lips is 6 in 3 minutes.
2. The record for popping 200 balloons with a nail is 37.25 seconds.
3. The women's record for jumping 100m on a space hopper is 38.2s
4. Most tosses of a pancake in one minute is 140.
5. The most pizzas made in one hour is 206, Findlay, Ohio, USA, on 9 December 2010.
6. The greatest distance paddled on a lake in 24 hours is 151.87 miles.

(Records are being broken all the time; some of these may have been broken already!)

Challenge

Sketch a line graph for the doughnut record, drawing points for each 30 seconds and joining with a line. Use the graph to check your answers. This graph is a straight line because the doughnuts were eaten at a constant rate. What do you think it might look like if they slowed down after 5 minutes because they were feeling queasy? What would the graph look like when they stop eating?

Multiplication and Division

Answers

Day 1 Y5 Common multiples and factors Sheet 1

Common multiples (○ = LCM)

1. 10, 20, 30, etc
2. 12, 24, 36, etc
3. 30, 60, 90, etc
4. 10, 20, 30, etc
5. 18, 36, 54, etc
6. 60, 120, 180, etc
7. 24, 48, 72, etc
8. 56, 112, 168, etc
9. 15, 30, 45, etc
10. 24, 48, 72, etc

Common factors (○ = HCF)

1. 1, 3
2. 1, 3, 5, 15
3. 1, 2, 5, 10
4. 1, 2, 4, 8
5. 1, 3
6. 1, 2, 3, 6
7. 1, 2, 7, 14
8. 1, 2, 3, 6
9. 1, 2, 4, 8, 16
10. 1, 2, 3, 4, 6, 12

Challenge

e.g. 42 and 91. Both have 7 as a factor.
81 and 51. Both have 3 as a factor.

Day 2 Y5 Square and cube numbers Sheet 1

1. The square numbers are:

4, 9, 16, 25, 36, 49, 64, 81, 100

2. $2^3 = 2 \times 2 \times 2 = 8$
 $3^3 = 3 \times 3 \times 3 = 27$
 $4^3 = 4 \times 4 \times 4 = 64$
 $5^3 = 5 \times 5 \times 5 = 125$

Challenge

$1^2 = 1$

$5^2 = 25$

$9^2 = 81$

$13^2 = 169$

$2^2 = 4$

$6^2 = 36$

$10^2 = 100$

$14^2 = 196$

$3^2 = 9$

$7^2 = 49$

$11^2 = 121$

$15^2 = 225$

$4^2 = 16$

$8^2 = 64$

$12^2 = 144$

Multiplication and Division

Answers

Day 2 Y5 Square and cube numbers Sheet 2

- $2^2 = 4$ ✓
- $3^2 = 6$ x $3^2 = 3 \times 3 = 9$
- $5^2 = 25$ ✓
- $4^2 = 8$ x $4^2 = 4 \times 4 = 16$
- $10^2 = 100$ ✓
- $9^2 = 18$ x $9^2 = 9 \times 9 = 81$
- $7^2 = 48$ x $7^2 = 7 \times 7 = 49$
- $6^2 = 36$ ✓
- $8^2 = 64$ ✓
- $2^3 = 8$ ✓
- $3^3 = 9$ x $3^3 = 3 \times 3 \times 3 = 27$
- $5^3 = 125$ ✓
- $4^3 = 64$ ✓
- $7^3 = 21$ x $7^3 = 7 \times 7 \times 7 = 343$
- $8^3 = 512$ ✓
- $10^3 = 100$ x $10^3 = 10 \times 10 \times 10 = 1000$
- $6^3 = 216$ ✓
- $9^3 = 629$ x $9^3 = 9 \times 9 \times 9 = 729$

Challenge

$1^2 = 1$

$5^2 = 25$

$9^2 = 81$

$13^2 = 169$

$17^2 = 289$

$2^2 = 4$

$6^2 = 36$

$10^2 = 100$

$14^2 = 196$

$18^2 = 324$

$3^2 = 9$

$7^2 = 49$

$11^2 = 121$

$15^2 = 225$

$19^2 = 361$

$4^2 = 16$

$8^2 = 64$

$12^2 = 144$

$16^2 = 256$

$20^2 = 400$

Multiplication and Division

Answers

Day 2 Y6 Goldbach's conjecture Sheet 3

Even numbers	Pairs of prime numbers	Even numbers	Pairs of prime numbers
6	3 + 3	22	19 + 3 or 17 + 5
8	5 + 3	24	19 + 5 or 17 + 7 or 13 + 11
10	5 + 5 or 7 + 3	26	23 + 3 or 19 + 7 or 13 + 13
12	7 + 5	28	23 + 5 or 17 + 11
14	11 + 3	30	23 + 7 or 19 + 11 or 17 + 13
16	11 + 5 or 13 + 3	32	29 + 3 or 19 + 13
18	13 + 5 or 11 + 7	34	31 + 3 or 29 + 5 or 23 + 11 or 17 + 17
20	17 + 3 or 13 + 7	36	31 + 5 or 29 + 7 or 23 + 13 or 19 + 17

Goldbach's conjecture might be true as all the even numbers up to 36 can be made by adding two prime numbers.

Day 3 Y5 Scale bedroom at Hogwarts Castle Sheet 1

Item	Life size dimensions	Model dimensions
Single bed	90cm wide, 2m long, 60cm high	9cm wide, 20cm long, 6cm high
Owl's cage	90cm tall, 40cm wide, 40cm deep	9cm tall, 4cm wide, 4cm deep
Box of potions	30cm by 20cm by 20cm	3cm by 2cm by 2cm
Desk	80cm tall, 1.2m wide, 70cm deep	8cm tall, 12cm wide, 7cm deep
Spells book	50cm tall, 30cm wide, 10cm deep	5cm tall, 3cm wide, 1cm deep
Wardrobe	80cm wide, 1.8m tall, 50cm deep	8cm wide, 18cm tall, 5cm deep
Chest of drawers	80cm wide, 80cm tall, 40cm deep	8cm wide, 8cm tall, 4cm deep
Bedside drawers	50cm wide, 40cm deep, 60cm tall	5cm wide, 4cm deep, 6cm tall

Challenge

Item	Approx life size dimensions	Model dimensions
<i>e.g. Trunk</i>	<i>95cm long, 70cm tall, 40cm wide</i>	<i>9.5cm long, 7cm tall, 4cm wide</i>
<i>e.g. Television</i>	<i>1m wide, 60cm tall, 10cm deep</i>	<i>10cm wide, 6cm tall, 1cm deep</i>
<i>e.g. Stool</i>	<i>60cm tall, 40cm x 40cm square seat</i>	<i>6cm tall, 4cm x 4cm square seat</i>

Multiplication and Division

Answers

Day 3 Y6 Scale bedroom at Hogwarts Castle Sheet 2

Item	Life size dimensions	Model dimensions
Single bed	90cm wide, 2m long, 60cm high	4.5cm wide, 10cm long, 3cm high
Owl's cage	90cm tall, 40cm wide, 40cm deep	4.5cm tall, 2cm wide, 2cm deep
Box of potions	30cm by 20cm by 20cm	1.5cm by 1cm by 1cm
Desk	80cm tall, 1.2m wide, 70cm deep	4cm tall, 6cm wide, 3.5cm deep
Spells book	50cm tall, 30cm wide, 10cm deep	2.5cm tall, 1.5cm wide, 0.5cm deep
Wardrobe	80cm wide, 1.8m tall, 50cm deep	4cm wide, 9cm tall, 2.5cm deep
Chest of drawers	80cm wide, 80cm tall, 40cm deep	4cm wide, 4cm tall, 2cm deep
Bedside drawers	50cm wide, 40cm deep, 60cm tall	2.5cm wide, 2cm deep, 3cm tall

Challenge

Item	Approx life size dimensions	Model dimensions
<i>e.g. Trunk</i>	<i>90cm long, 70cm tall, 40cm wide</i>	<i>4.5cm long, 3.5cm tall, 2cm wide</i>
<i>e.g. Television</i>	<i>1m wide, 60cm tall, 10cm deep</i>	<i>5cm wide, 3cm tall, 0.5cm deep</i>
<i>e.g. Stool</i>	<i>60cm tall, 40cm x 40cm square seat</i>	<i>3cm tall, 2cm x 2cm square seat</i>

Day 4 Y5 Rates Sheet 1

- A space hopper champion can hop 3 metres every second. How far can be hopped in 30 seconds? In a minute?

The space hopper champion can hop 90 metres in 30 seconds and 180 metres in a minute.
- A record holder can pop 5 balloons every second with a nail. How many balloons will be popped in 30 seconds? In a minute?

The record holder could pop 150 balloons in 30 seconds and 300 balloons in a minute.
- A food record challenger can eat a sugared doughnut in 30 seconds. How many could be eaten in 5 minutes? In 10 minutes?

The challenger could eat 10 doughnuts in 5 minutes and 20 doughnuts in 10 minutes.
- A professional typist can type 60 words per minute. How many words could be typed in 30 seconds? In 10 minutes?

The professional typist can type 30 words in 30 seconds and 600 words in 10 minutes.
- A tea lover drinks tea at the rate of 9 cups a day. How many cups are drunk in a week? A month? A year?!

The tea lover drinks 63 cups in a week, 270 cups in a (30 day) month and 3285 cups in a year.
- A book lover reads 20 pages an hour. How long will it take to finish a 240 page book?

The book lover will take 12 hours to read a 240 page book.
- A person working in a supermarket is paid £6.50 per hour. How much will they earn in 8 hours?

The supermarket worker will earn £52 in 8 hours.
- A hot air balloon is gently descending at the rate of 20 metres per minute. If it is 600m above the ground, how long will it take to reach the ground?

The hot air balloon will take 30 minutes to reach the ground.

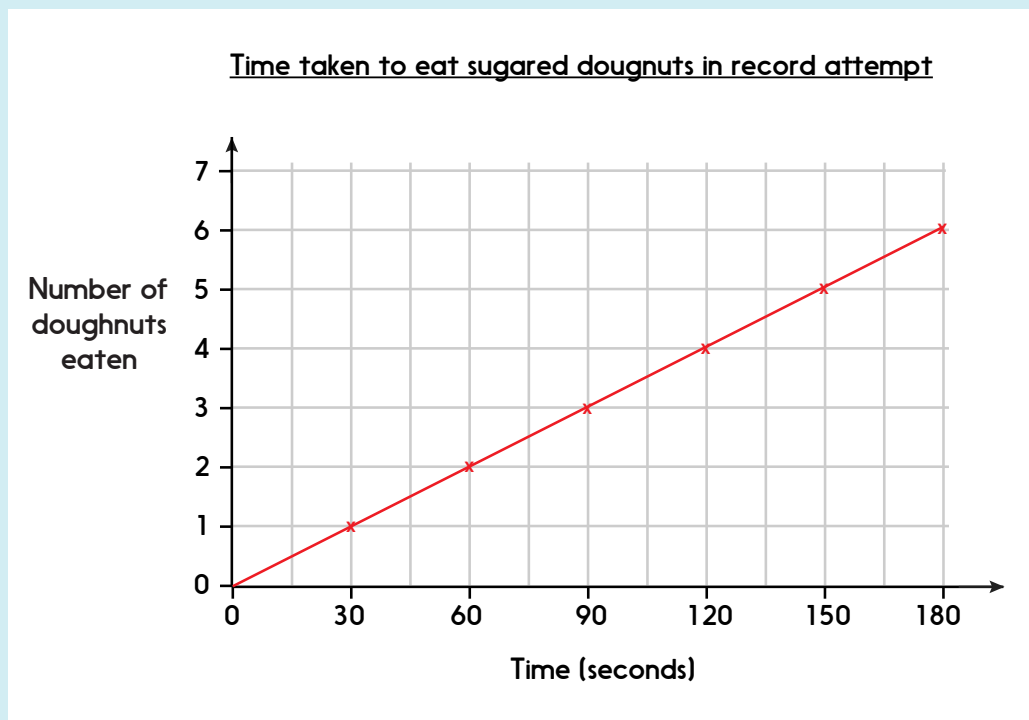
Multiplication and Division

Answers

Day 4 Y6 Rates Sheet 2

1. The rate is **1 doughnut per 30 seconds** or **2 doughnuts per minute**.
2. The rate they had to aim for was **6 balloons per second**.
(They achieved 5.37 balloons per second.)
3. The rate they had to aim for was **4 metres per second**.
(They achieved 3.31 metres per second.)
4. The rate they had to aim for was **3 tosses per second**.
(They achieved 2.33 tosses per second.)
5. The rate they had to aim for was **4 pizzas per minute**.
(They achieved 3.43 pizzas per minute.)
6. The rate they had to aim for was **7 miles per hour**.
(They achieved 6.33 miles per hour.)

Challenge



After 5 minutes the graph will begin to level out as the number of doughnuts eaten slows down.

When they stop eating, the line on the graph will be horizontal.