The Mathematics Department

7

Welcome to Ysgol y Creuddyn

Version 3.0
07/2025

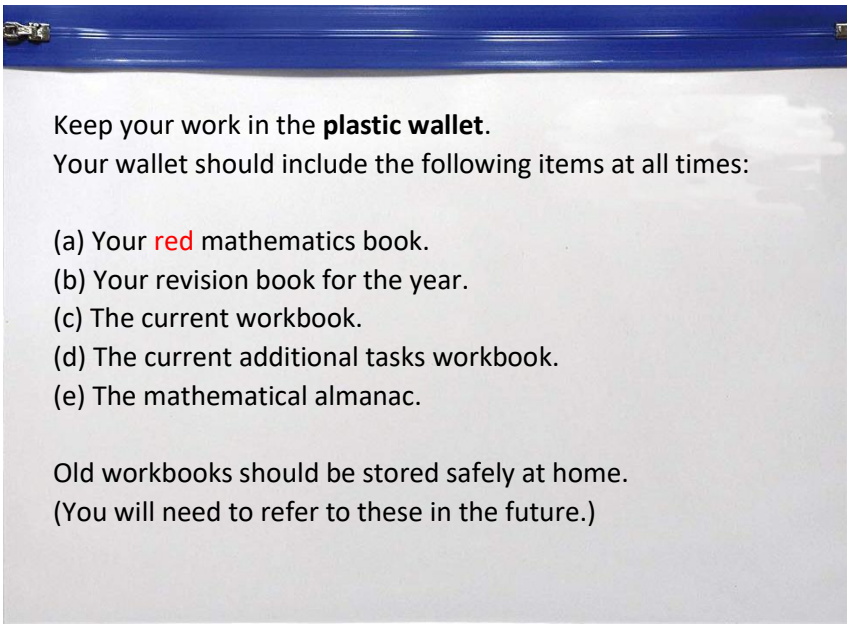
Name:

Contents

The Mathematics Department

Welcome to the mathematics department! Here are some guidelines for looking after your work.

- At the start of every lesson, write "Classwork", the date and a suitable title for the work. Each of these should be underlined.
- No blank pages should be left in the red mathematics book.
- Draw diagrams using a pencil and, where appropriate, using the correct equipment, e.g. ruler, protractor, compass.
- Show your method fully.
- Remember to include relevant units in your answers, e.g. cm, £, ml.



Equipment

- Black, red and blue biros.
- HB Pencil.
- Ruler (a 30 cm one is better).
- Eraser.
- Protractor.
- Compass.
- Scientific calculator (e.g. Casio FX-83GTCW).
- Highlighter.

The Revision Book

This will form the basis for your GCSE revision.

- Complete at least 4 pages in your revision book for each unit of work.
- You should include material you will need in the future for remembering the work quickly. This can include notes on the work; examples; important facts; and revision posters.

Workbooks

You will receive 1 copy of the workbook and 1 copy of the additional tasks workbook at the start of each new unit of work. (If you lose the workbook, a new one will cost 50p.)

A Welsh copy of the workbook, and additional supporting materials, can be found on the department's website, www.mathemateg.com

Content of the workbooks

When you see a QR code (like the one on the left), scan it using your mobile device in order to reach a Welsh YouTube video hosted on the following channel.

www.youtube.com/adolygumathemateg

The numbers in circles, for example (3), show which GCSE unit the work appears in.

Circle	1	2	3	12	13	23	A
Units	1	2	3	1 and 2	1 and 3	2 and 3	1, 2 and 3

All the workbooks contain a variety of exercises, labelled as follows.

Skill

Exercises on new topics.

Applying

Answering a question in context, or solving a problem.

Extension

A more difficult question.

Revision

Revision of material from previous workbooks.

Evaluation

There are evaluation boxes at the end of each chapter to revise the completed work.

Key words	Corrections	I am happy with...	I need to revise...
Write down the new or important mathematical terms from the chapter.	What do you need to remember when completing this type of work in the future?	Write down the topics you had success with.	Write down the topics you need to look at again.

Curriculum for Wales Proficiencies

Conceptual understanding

Communication using symbols

Strategic competence

Logical reasoning

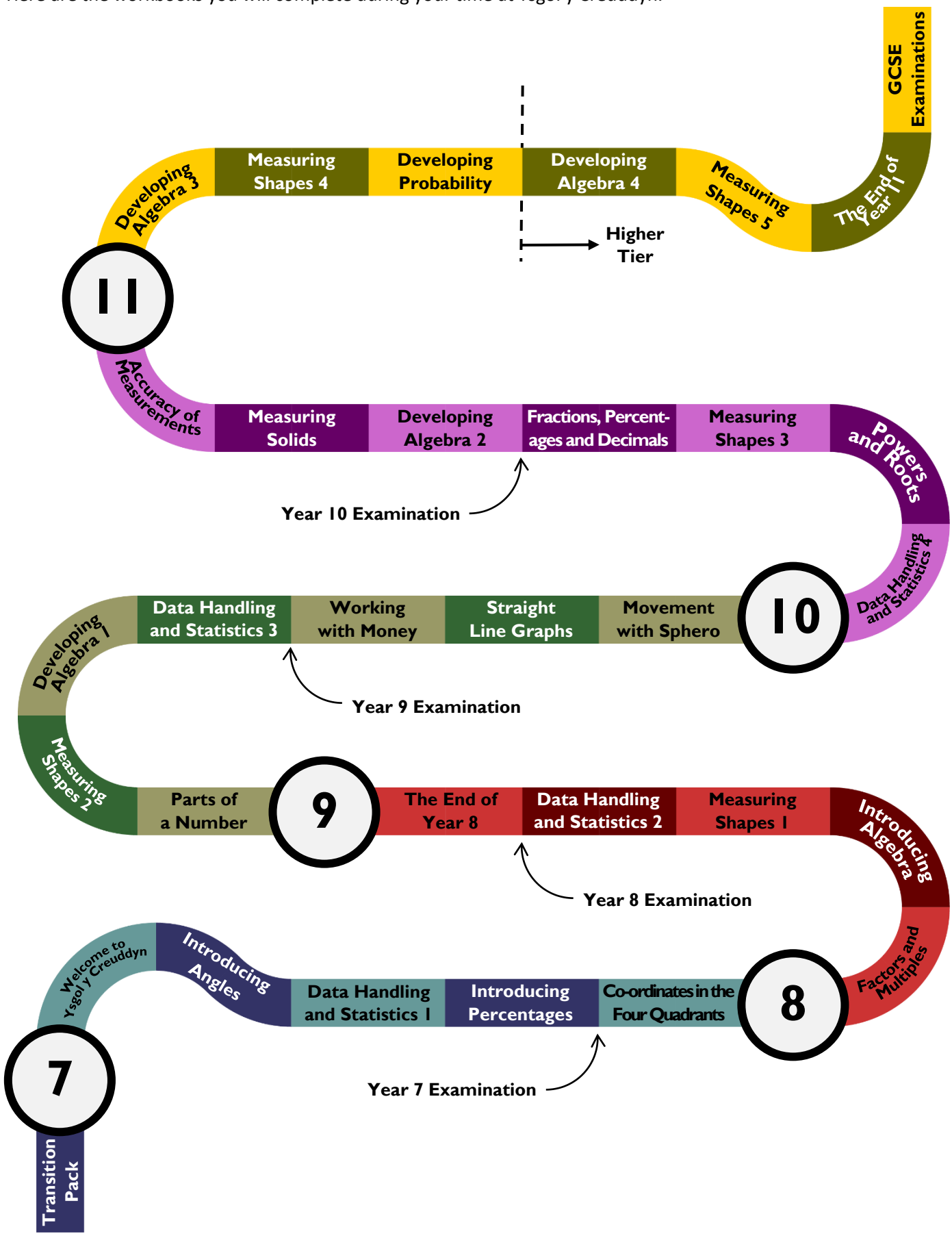
Fluency

Supporting Materials:

- Diagnostic Questions
  - A quiz for each workbook on the website www.diagnosticquestions.com.
- Reflection Sheet
  - An opportunity to assess your understanding of a workbook, and to see the test question order.
- Old WJEC examination questions; worksheets; investigations; puzzles.
  - Available for some topics.

Mathematics Learning Journey for Ysgol y Creuddyn

Here are the workbooks you will complete during your time at Ysgol y Creuddyn.



The Library

The library is located above the English block, in block A. The sixth form study in the library.

Each book has a special number, an **ISBN**, which is an acronym for *International Standard Book Number*. Since 2007, ISBN numbers have 13 digits. The final digit is a **check digit** to help bar code readers read an ISBN for a particular book.

For example, the picture on the left shows the bar code for the book *Gwyddoniadur Cymru*.

To ensure that the ISBN is correct, we must alternatively multiply the digits by 1 and 3, and then find the total of all the multiplication sums.

Write down the ISBN digits in the first column.

Place the units under the units, and the tens under the tens.

Write one number or symbol in each square of the 1 cm squared paper.

If you find adding the units in one sum difficult, split the sum into smaller pieces.

Carry the 6 tens into the tens column.

9	×	1	=			9
7	×	3	=		2	1
8	×	1	=			8
0	×	3	=			0
7	×	1	=			7
0	×	3	=			0
8	×	1	=			8
3	×	3	=			9
1	×	1	=			1
9	×	3	=		2	7
5	×	1	=			5
4	×	3	=		1	2
3	×	1	=			3
				1	1	0
					6	

Because 110 is a **multiple of 10**, this ISBN is correct. If the total had not been a multiple of 10, then there would have been a mistake somewhere.

Exercise 1 A

Applying

Which of the following are valid ISBN numbers?

(a) 978-1-8452-7516-7 (b) 978-1-8485-1997-9 (c) 978-1-8468-8423-7
(d) 978-1-7847-5263-7 (e) 978-1-4088-5565-2 (f) 978-1-4088-5868-3
(g) 978-1-3545-5102-4 (h) 978-0-0074-8831-5 (i) 978-0-2342-2359-2

Extension

Challenge!

For the valid ISBN numbers above, which books give these numbers? (Investigate using the Internet.)

Multiples

With ISBN numbers, it was easy to verify whether a total was a multiple of 10, as all multiples of 10 end with a zero. But what about other multiples? Here are some techniques to help.

2

A number is a multiple of 2 if it is an even number, so ends with either a 2, 4, 6, 8 or 0.

3

A number is a multiple of 3 if the sum of its digits is a multiple of 3. For example, 47268 is a multiple of 3, as $4 + 7 + 2 + 6 + 8 = 27$ is a multiple of 3.

4

A number is a multiple of 4 if it is a multiple of 2 **and** half of its last two digits is a multiple of 2. For example, 486 is not a multiple of 4, as half of 86, 43, is not a multiple of 2.

5

A number is a multiple of 5 if it ends with either a 5 or a 0.

Skill

Exercise 2 A

(a) Which of the following numbers are multiples of 2?

27 82 192 2828 1293 28 95 8629 2380 29 0 238 92

(b) Which of the following numbers are multiples of 3?

39 512 1569 6495 84652 24155 543 918 64578 9 254 26 54374

(c) Which of the following numbers are multiples of 4?

48 66 75 100 128 150 240 364 601 2710 5864 12912 531052

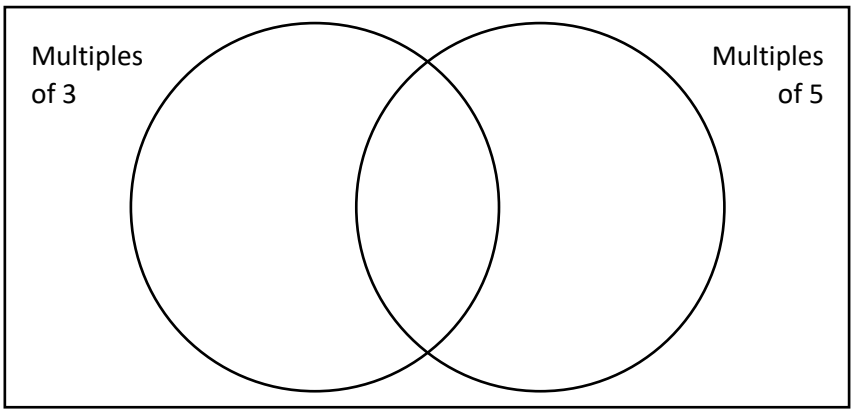
(d) Which of the following numbers are multiples of 5?

51 165 70 502 3215 5400 214 15 39552 5001 6020 687 654650

Exercise 3

Complete the following Venn diagram using the numbers below. A

25 18 26 30 95 36 60 14 31 45 75 72 100 105



Challenge! 

Extension

(a) Which numbers between 1 and 100 are multiples of 3 and 5?
(b) Which numbers between 1 and 100 are multiples of 4 and 5?
(c) Which numbers between 1 and 100 are multiples of 2, 3, 4 and 5?

Mwy o Luosrifau

6 A number is a multiple of 6 if it is a multiple of 2 **and** a multiple of 3.

7 A number is a multiple of 7 if multiplying the final digit by 5 and then adding the rest of the number gives a multiple of 7. For example, considering 147:
7 × 5 = 35, 35 + 14 = 49.
49 is a multiple of 7
so 147 is a multiple of 7.

8 A number is a multiple of 8 if it is a multiple of 2 **and** half of the number is a multiple of 4.

9 A number is a multiple of 9 if the sum of its digits is a multiple of 9.

10 A number is a multiple of 10 if it ends with a 0.

Exercise 4

Skill

A

(a) Which of the following numbers are multiples of 6?

18 23 32 42 78 120 130 250 300 301 340 500 600

(b) Which of the following numbers are multiples of 7?

15 28 35 44 63 76 84 105 119 132 140 217 279

(c) Which of the following numbers are multiples of 8?

56 88 100 105 140 160 200 250 256 328 360 420 1600

(d) Which of the following numbers are multiples of 9?

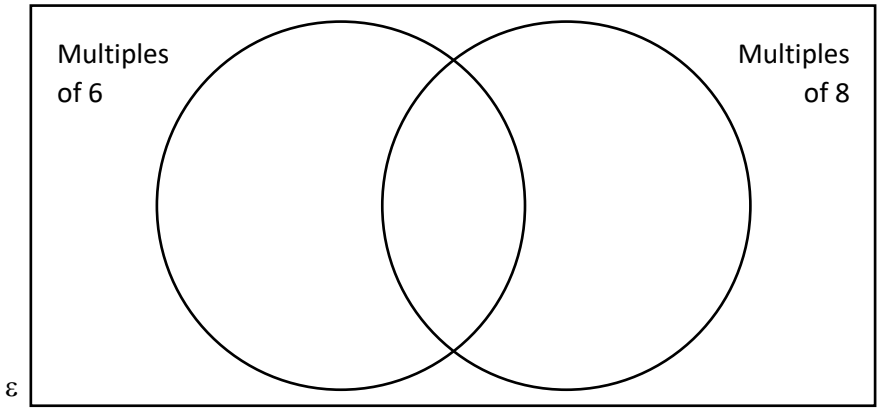
45 65 99 124 351 486 845 909 1542 1978 5229 9571 26946

Exercise 5

A

Complete the following Venn diagram using the numbers below.

3 12 16 20 24 30 38 40 44 48 54 56 58 96



Exercise 6

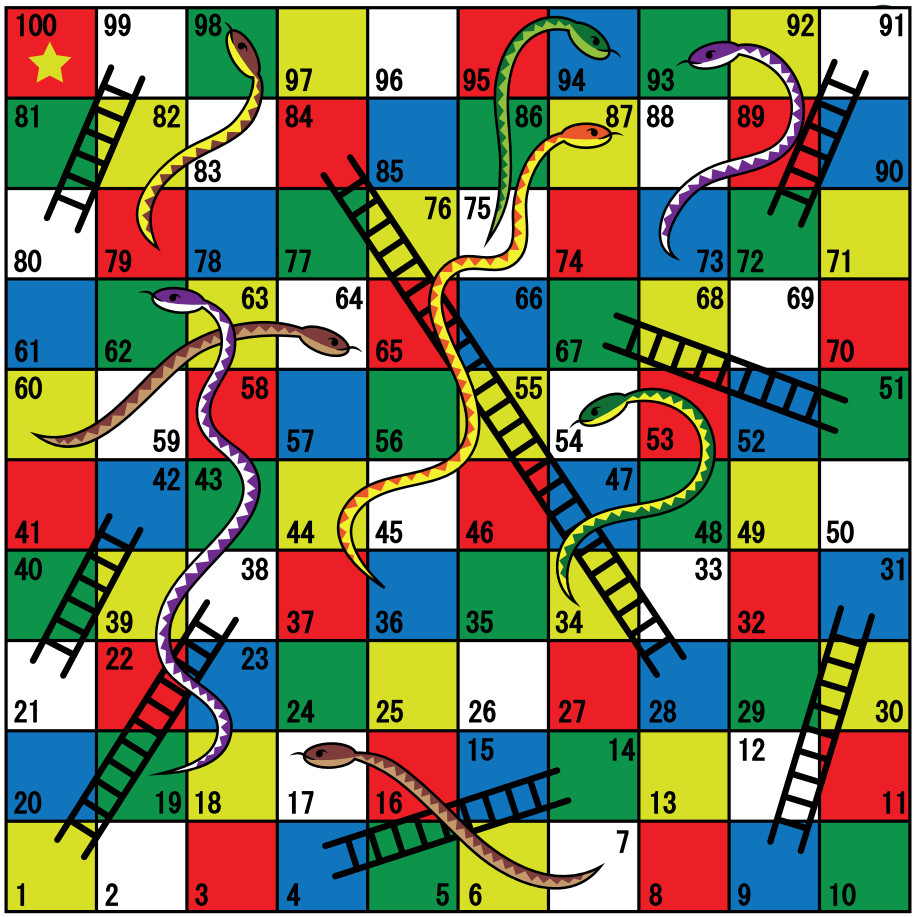
A

True or False?

(a) 432 is a multiple of 2.
(b) 792 is a multiple of 3.
(c) 2632 is a multiple of 4.
(d) 8273 is a multiple of 5.
(e) 824 is a multiple of 6.
(f) 432 is a multiple of 7.
(g) 1620 is a multiple of 8.
(h) 72513 is a multiple of 9.
(i) 70281 is a multiple of 10.

Exercise 7 A

The following questions refer to the Snakes & Ladders game on the right.



(a) The first ladder goes from 1 to 38. Is 38 a multiple of 2?

(b) The final snake goes from 98 to 79. Is 98 a multiple of 3?

(c) The longest ladder goes from 28 to 84. Is 84 a multiple of 7?

(d) (i) What is the total number of snakes and ladders on the board?
(ii) Is your answer to part (i) a multiple of 8?

(e) Find the ladder that doubles your number. Is the number you end on a multiple of 6?

(f) The top row of the board (91 to 100) contains 3 snakes, but how many numbers in the top row are multiples of 3?

(g) The goal of the game is to finish on 100. Is 100 a multiple of 20?

Exercise 8 A

(a) Which is the first multiple of 7 over 50?

(b) Which is the first multiple of 9 over 60?

(c) Which is the first multiple of 4 over 130?

(d) Which is the first multiple of 6 over 90?

(e) Which is the first multiple of 11 over 100?

(f) Which is the first multiple of 3 over 700?

Exercise 9 (Revision) A

(a) When is a number a multiple of 3?

(b) When is a number a multiple of 8?

(c) Write down the multiples of 6 between 50 and 80.

(d) Write down the multiples of 9 between 30 and 60.

Evaluation

Key Words	Corrections	I am happy with…	I need to revise…

The Hall

The hall is located in the centre of the school, by reception. Morning assembly; drama lessons; performances of musicals and much more take place here!

Can you see from the picture the **shape** of the **floor of the hall**?

Exercise 10

Name the shapes with the following number of sides.

Skill A

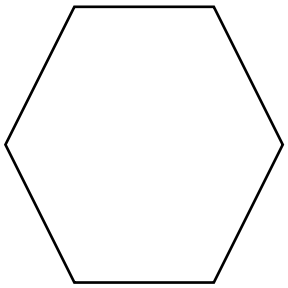
(a) 3
(b) 4
(c) 5
(d) 6
(e) 7
(f) 8
(g) 9
(h) 10

Exercise 11

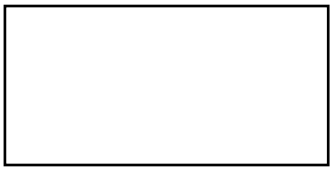
A

What is the name of the following shapes?

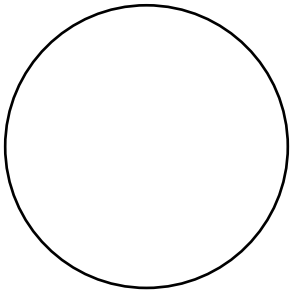
(a)



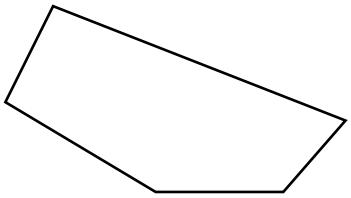
(b)



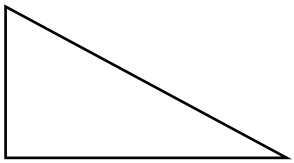
(c)



(d)

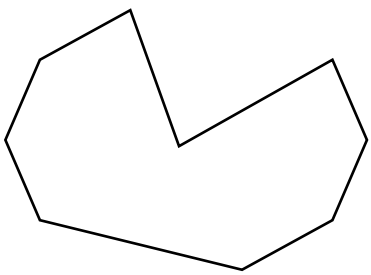


(e)

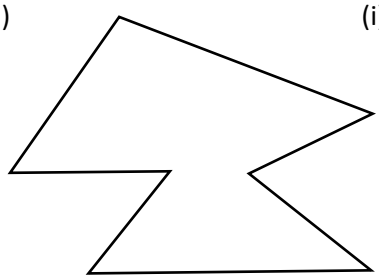


(f)

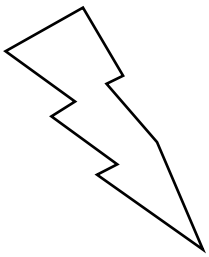
(g)



(h)

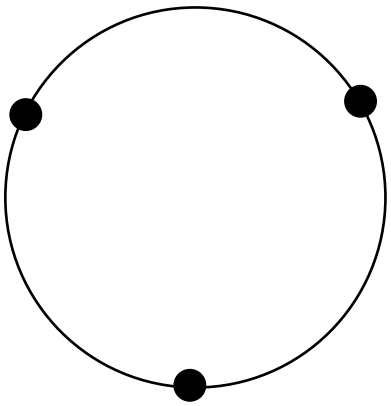


(i)



Investigation

Using a compass, draw a circle in your book (use a radius of around 4cm). Add three dots to your circle, as shown in the diagram on the right. Using straight lines, connect the dots in every possible way. Verify that this divides the circle into four regions. Repeat with a circle that has four dots, five dots, and so on. How many regions are formed each time? Is there a pattern?



Dots	**2**	**3**	**4**	**5**	**6**	**7**
Regions	2	4				

Regular and Irregular Polygons

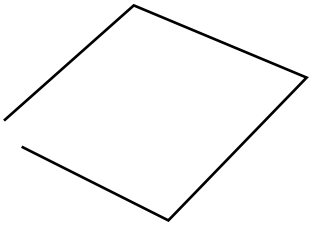
A closed shape that uses straight lines only is called a **polygon.**

Exercise 12

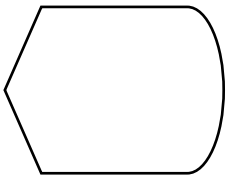
Explain which of the following shapes are polygons, and which are not polygons.

(a)

(b)

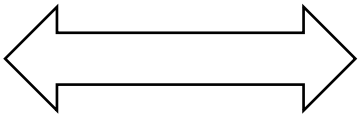


(c)

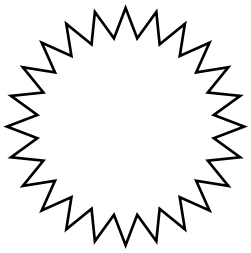


(d)

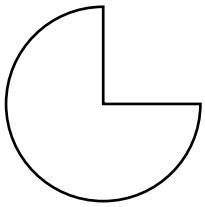
(e)



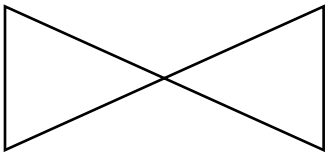
(f)



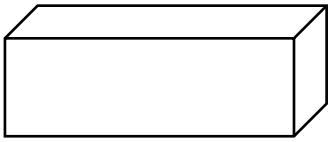
(g)



(h)



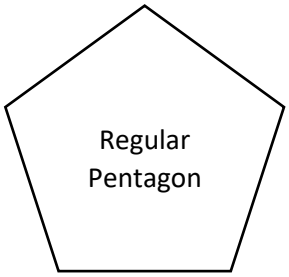
(i)



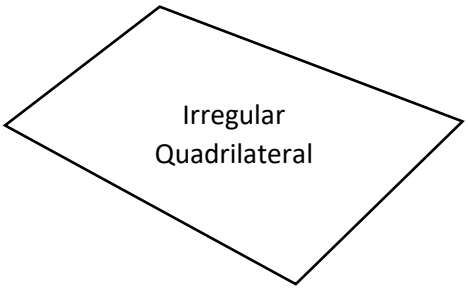
A polygon is **regular** if its sides all have the same length and its angles are also all equal.
If the polygon is not regular, then it is an **irregular** polygon.

Example

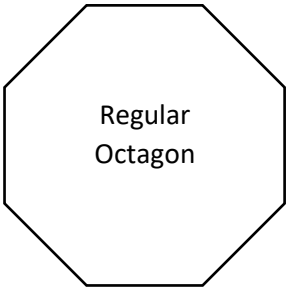
(a)



(b)



(c)

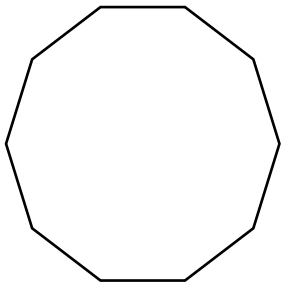


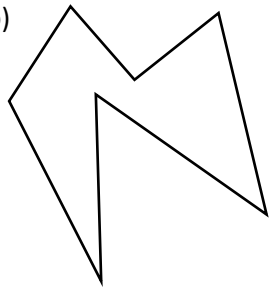
Exercise 13

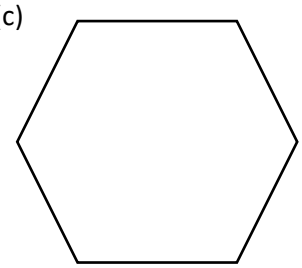
Skill

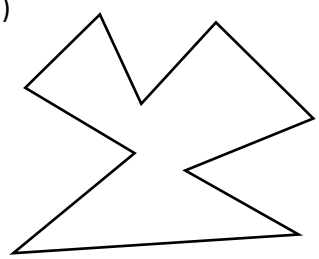
A

Name the following polygons.

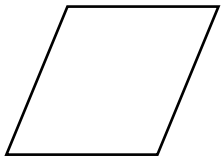
(a) 

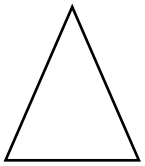
(b) 

(c) 

(d) 

(e) Explain why the following shapes are **not** regular polygons.

(i) Rhombus 

(ii) Isosceles Triangle 

(iii) Rectangle 

Challenge! 

Try to say the names of the following polygons...

Number of sides	Name	Number of sides	Name
13	Triskaidecagon	**39**	Triacontakaienneagon
21	Icosikaihenagon	**45**	Tetracontakai pentagon
25	Icosikaipentagon	**100000**	Megagon
31	Triacontakaihenagon	10^{100}	Googolgonalmost

Special Lines

Consider the picture shown of the musical “Herspre” (December 2014).

Can you see any **horizontal** lines?

Can you see any **vertical** lines?

Can you see any **parallel** lines?

Can you see any **perpendicular** lines?

Exercise 14

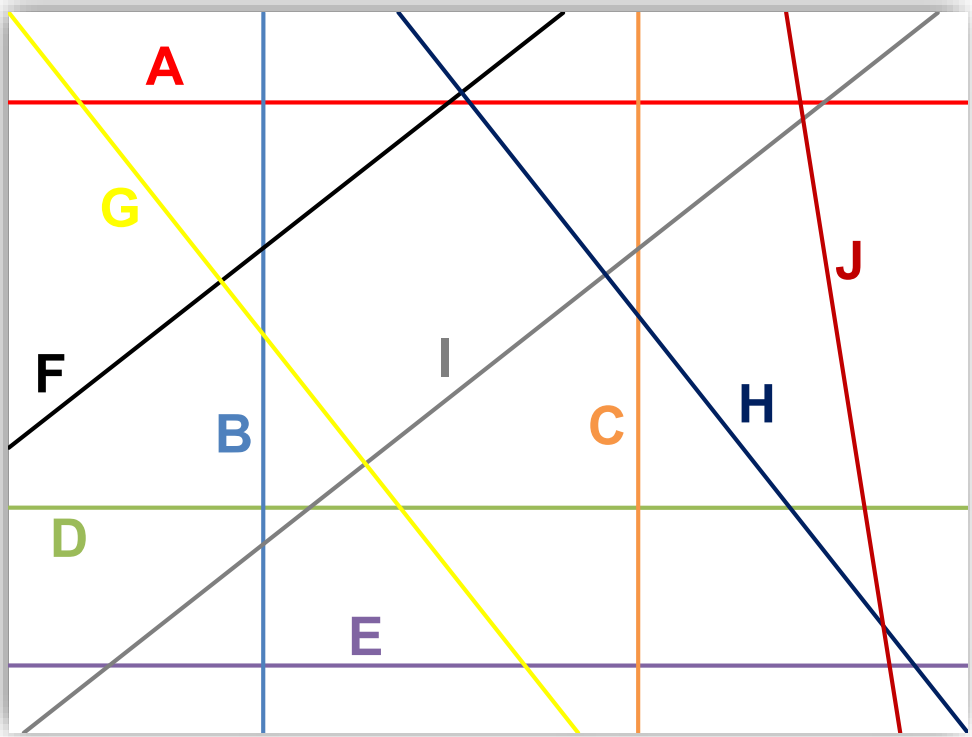
A

In your book, explain what is meant by a *horizontal* line; a *vertical* line; *parallel* lines; and *perpendicular* lines.

Exercise 15 A

Use the diagram on the right to list:

(a) the horizontal lines;
(b) the vertical lines;
(c) the pairs of parallel lines;
(d) the pairs of perpendicular lines.

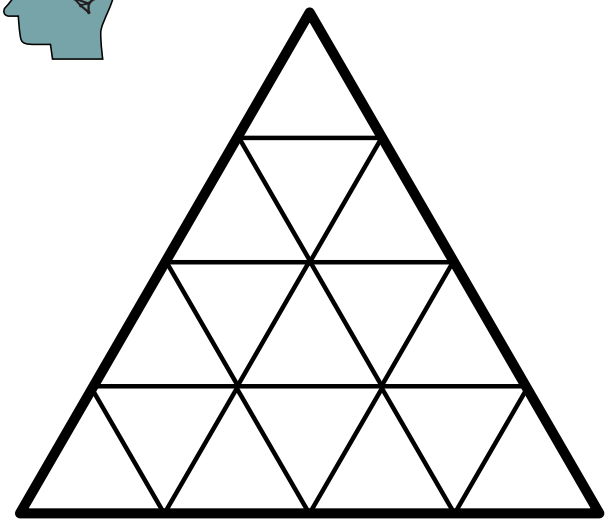


Did you know?

The word "parallel" comes from the Latin word "parallēlus" meaning side-by-side.

Puzzle

How many triangles can be seen in the diagram on the right?



Exercise 16 (Revision) A

(a) How many sides does a heptagon have?

(b) Draw a regular quadrilateral.
What is the usual name for this shape?

(c) Draw a pair of perpendicular lines.

(d) I have 4 octagons, 3 hexagons and 2 nonagons.
How many sides do I have?

Evaluation

Key Words	Corrections	I am happy with…	I need to revise…

The Sports Hall

The sports hall was built during 2005-06, with the official opening taking place in the summer term of 2006. The school uses the hall during the day, and the local community at night.

It is possible to modify the hall for the use of many different sports.

Exercise 17

How many players are needed to form a **team** in these sports?

(a) Netball
(b) Football
(c) Basketball
(d) Cricket
(e) Rugby league
(f) Rugby union.

What do you notice about all your answers to Exercise 17?

Exercise 18

Skill A

(a) Which of the following numbers are even numbers?
23 86 99 104 158 2603 3547 6712 95420 451245874

(b) Which of the following numbers are odd numbers?
8 41 59 84 107 245 659 1054 5249 3154287

(c) List the 5 even numbers after 95.

(d) List the 5 odd numbers after 36.

(e) Explain what the difference is between an odd number and an even number.

Exercise 19 A

(a) What is the largest odd number that can be made using 7, 1, 6, 4, 8?

(b) What is the smallest even number that can be made using 6, 5, 2, 1, 9?

(c) Answer “always”, “sometimes” or “never” to the following questions.

(i) Adding two even numbers gives an even number.
(ii) Adding two odd numbers gives an odd number.
(iii) Multiplying two even numbers gives an even number.
(iv) Multiplying two odd numbers gives an odd number.
(v) Multiplying an odd number by an even number gives an odd number.

Sports Day

Challenge!

Think of a sport which requires an even number of players to form a team.

Square Numbers

Just as the even numbers form a number pattern, the **square numbers** also form a number pattern. To illustrate this pattern, consider the following sequence of squares.

1 4 9 16 ....

What will be the next number in the sequence? And the one after that?

It is possible to write the numbers in this sequence as multiplication sums:

1×1 2×2 3×3 4×4 ....

To get 16, which is the fourth number in the sequence, we multiply four by itself. This is written mathematically as $\mathbf{4^2}$, and we say that we are calculating "**four squared**". Therefore, $4^2 = 4\times4 = 16$.

Exercise 20

Skill

A

Evaluate the following square numbers.

(a) 7^2 (b) 5^2 (c) 9^2 (d) 10^2 (e) 8^2 (f) 6^2

Exercise 21 A

Calculate the following sums.

(a) $1^2 + 3^2$ (b) $4^2 + 5^2$ (c) $1^2 + 2^2 + 3^2 + 4^2 + 5^2$ (d) $10^2 - 6^2$ (e) $12^2 - 2^2$

(f) $5^2 - 4^2 - 3^2$ (g) $2^2 - 1^2$ (h) $3^2 \times 4^2$ (i) $1^2 \times 13^2$ (j) $2^2 \times 9^2 \times 1^2$

(k) $5^2 \times 2^2 \times 1^2$ (l) $10^2 \div 5^2$ (m) $8^2 \div 4^2$ (n) $5^2 \div 1^2$ (o) $5^2 \div 2^2$

(p) $5^2 \times 2^2 - 1^2$ (q) $4^2 \div 1^2 + 3^2$ (r) $8^2 \times 1^2 \div 2^2$ (s) $7^2 + 4^2 + 10^2 - 9^2$

Challenge! A

(a) A number is palindromic if it reads the same backwards as it does forwards. For example, 373 is a palindromic number. Find the first three square numbers that are palindromic. (Clue: The answers are greater than 100, but less than 1000.)

Aiming Higher

(b) Find two square numbers that add to give another square number.

(c) Find three square numbers that add to give another square number.

Extension

Investigation: The Golden Number

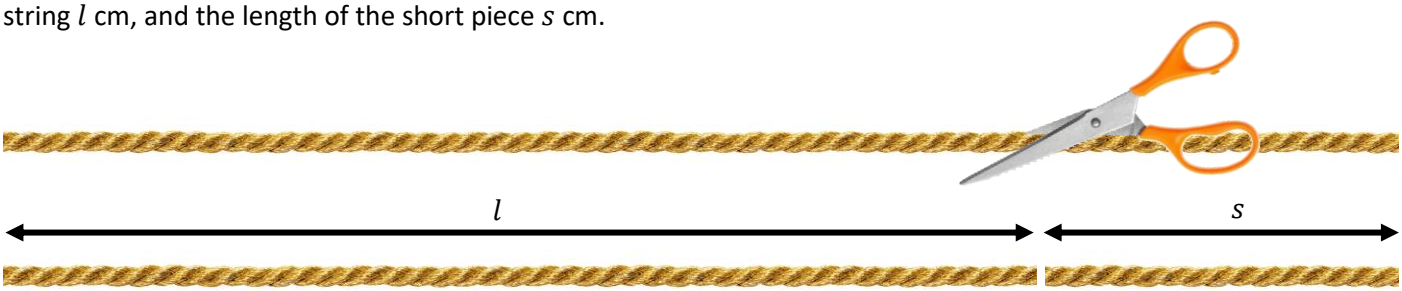
Applying

Problem 1

When we square any number more than one, we obtain an answer that is greater[1]. For example, when squaring 3, we obtain 9; it follows that 3 is six less than its square. Question: Which number is **exactly one less** than its square? Investigate for a few minutes using your calculator…

Problem 2

Consider a piece of string with a length of 1m, or 100cm. You are allowed to cut the string in any place, but not in the middle. This leaves two pieces of string – a long piece and a short piece. Let us call the length of the long piece of string l cm, and the length of the short piece s cm.



Question: Where should the string be cut so that $100 \div l$ is the same as $l \div s$?
Investigate for a few minutes using your calculator…

The Answer

It turns out that both problems have a connection to a special number known as the golden number. The symbol for the golden number is Φ ("Phi"). One way of finding Φ is to consider the **Fibonacci sequence**. In this sequence, we obtain the next number by adding the two previous numbers. Starting with 1 and 1, the sequence continues like this:

1, 1, 2, 3, 5, 8, 13, 21, 34, ...

Exercise 22 A

Find the next five numbers in the Fibonacci sequence.

Consider dividing the number in the Fibonacci sequence like this: $1 \div 1$, $2 \div 1$, $3 \div 2$, $5 \div 3$, $8 \div 5$, ... (can you see the pattern?) As Fibonacci's sequence continues, these division sums give an answer that is closer and closer to the golden number Φ.

Exercise 23 A

Using your answer to Exercise 22, write down your best estimate for Φ. What is the link between Φ and problems 1 and 2 above?

Extension

The Golden Number and the Body

Calculate the following ratios. What do you notice?

(a) Distance from the floor to your belly button ÷ Distance from the floor to your knee.

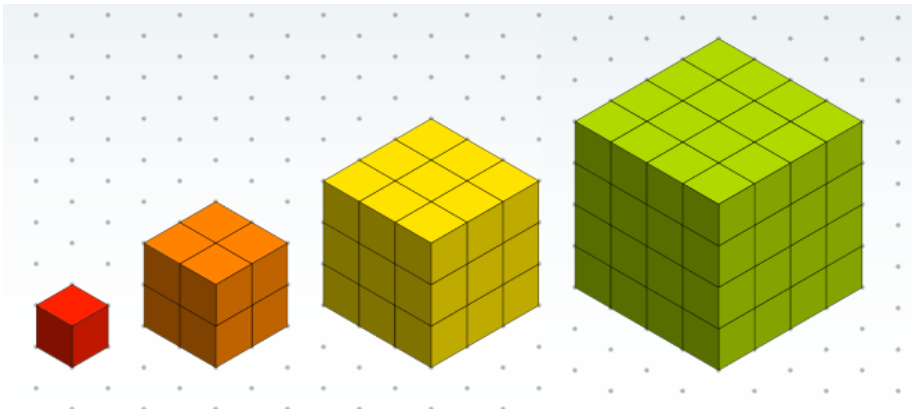
(b) Distance from your wrist to your elbow ÷ Length of your hand.

Sports Day

[1] What happens if you square a number between 0 and 1?

Cube Numbers

The **cube numbers** come from the following set of diagrams of cubes.



1 8 27 64 ....

What will be the next number in the sequence? And the one after that?

It is possible to write the numbers in this sequence as multiplication sums:

1×1×1 2×2×2 3×3×3 4×4×4 ....

To get 64, which is the fourth number in the sequence, we multiply four by itself three times. This is written mathematically as $\mathbf{4^3}$, and we say that we are calculating "**four cubed**". Therefore, $4^3 = 4\times4\times4 = 64$.

Exercise 24

Skill

A

Evaluate the following cube numbers.

(a) 5^3 (b) 6^3 (c) 7^3 (d) 8^3 (e) 9^3 (f) 10^3

Exercise 25

A

Calculate the following sums.

(a) $2^3 + 3^3$ (b) $3^3 + 4^3$ (c) $7^3 - 4^3$ (d) $10^3 \times 1^3$

(e) $4^3 + 5^3$ (f) $6^3 + 1^3 + 2^3$ (g) $2^3 \times 5^3$ (h) $1^3 \times 5^3$

(i) $8^3 + 9^3$ (j) $4^3 \div 1^3$ (k) $10^3 \div 2^3$ (l) $10^3 - 2^3$

Evaluation

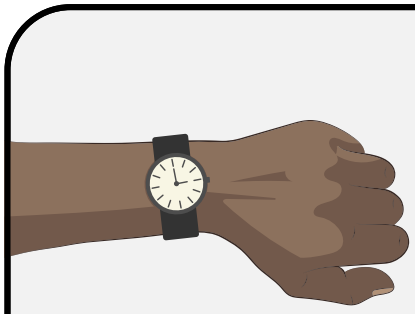
Key Words	Corrections	I am happy with...	I need to revise...

The School Timetable

Skill 13

Exercise 26

Fill in the following blanks.



1 minute = _____ seconds

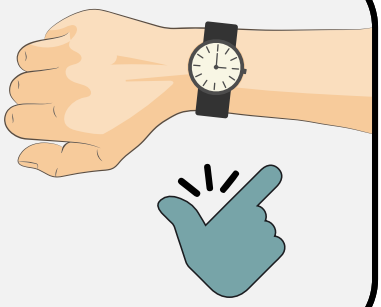
1 hour = _____ minutes

1 day = _____ hours

1 week = _____ days

1 year = _____ or _____ days

1 century = _____ years



Exercise 27 13

Fill in the following blanks.

(a) 3 minutes = _____ seconds

(b) Half a minute = _____ seconds

(c) 2 hours = _____ minutes

(d) An hour and a quarter = _____ minutes

(e) Fortnight = _____ days

(f) 1 week = _____ hours

(g) 1 year = _____ weeks

(h) 52 weeks = _____ days

(i) What do you notice about your answers to (g) and (h) above?

Exercise 28 13

Fill in the following blanks for dates in 2024.

Numbers	Words
25/12/24	
23/2/24	
10/7/24	
6/9/24	
	August 31st
	March 1st
17/2/24	
	May 20th
	November 5th

Numbers	Words
4/3/24	
12/8/24	
	February 27th
	April 19th
30/1/24	
13/5/24	
	June 12th
11/4/24	
	October 3rd

Exercise 29 A

How many minutes are there between the following times?

(a) 3:00pm and 3:30pm

(b) 2:15pm and 2:47pm

(c) 6:47am and 7:02am

(d) 10:23pm and 11:10pm

(e) 9:24am and 11:00am

(f) 1:57pm and 4:28pm

The Timetable

Here is the school timetable for Ysgol y Creuddyn.

08:55 – 09:15	*Registration Period / Assembly*
09:15 – 10:05	*Lesson 1*
10:05 – 10:55	*Lesson 2*
10:55 – 11:10	*Break*
11:10 – 12:00	*Lesson 3*
12:00 – 12:50	*Lesson 4*
12:50 – 13:45	*Dinner Time and Activities*
13:45 – 13:50	*Warning Bell*
13:50 – 14:40	*Lesson 5*
14:40 – 15:30	*Lesson 6*

Exercise 30

(a) What is the length of the registration period, in minutes?

(b) How many minutes are there between the end of lesson 4 and the end of lesson 6?

(c) What is the length of the school day, in hours and minutes?

Applying A

(d) You are exactly half way into lesson 2. What is the time?

(e) The headmaster grants an extension of twenty five minutes to the usual break. When will lesson 3 start?

(f) What is the length of break time in seconds?

The 12 hour clock and the 24 hour clock

There are two methods for telling the time.

(1) The **12 hour** clock, e.g. 2:45 a.m., 11:40 p.m, 7:45 a.m.
(2) The **24 hour** clock, e.g. 02:45, 16:42, 12:32.

The 24 hour clock runs from 00:00 to 23:59. The times from 00:00 to 11:59 are a.m. times, and the times from 12:00 to 23:59 are p.m. times.

The letters a.m. stand for Ante Meridiem (from the Latin, meaning “before midday”). The letters p.m. stand for Post Meridiem (again from the Latin, meaning “after midday”).

Exercise 31

Complete the following table.

Skill A

12 hour clock	24 hour clock
2:34 p.m.	
4:56 a.m.	
9:20 p.m.	
12:00 a.m.	
2:45 a.m.	
11:38 p.m.	
3:30 p.m.	
7:34 a.m.	
8:30 p.m.	
12:00 p.m.	

12 hour clock	24 hour clock
	11:15
	18:31
	00:45
	06:30
	16:54
	22:13
	08:55
	13:04
	01:25
	21:59

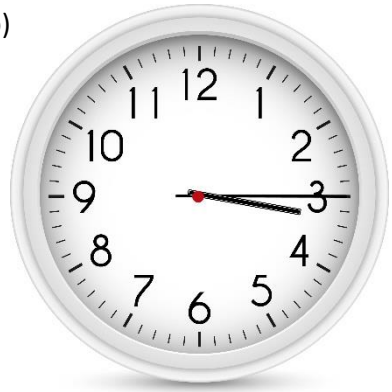
Exercise 32

A

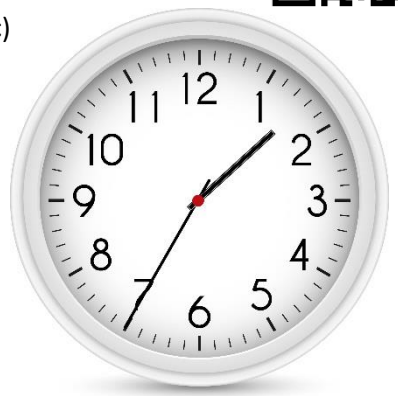
The following clocks show the time at different stages during the school day. For each one, write down (i) The time using the 12 hour clock; (ii) The time using the 24 hour clock; (iii) The time in words.

(a)

(b)

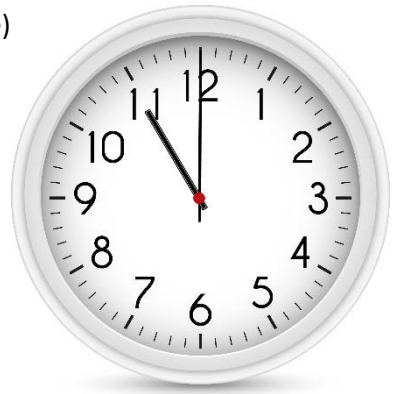


(c)



(d)

(e)



(f)

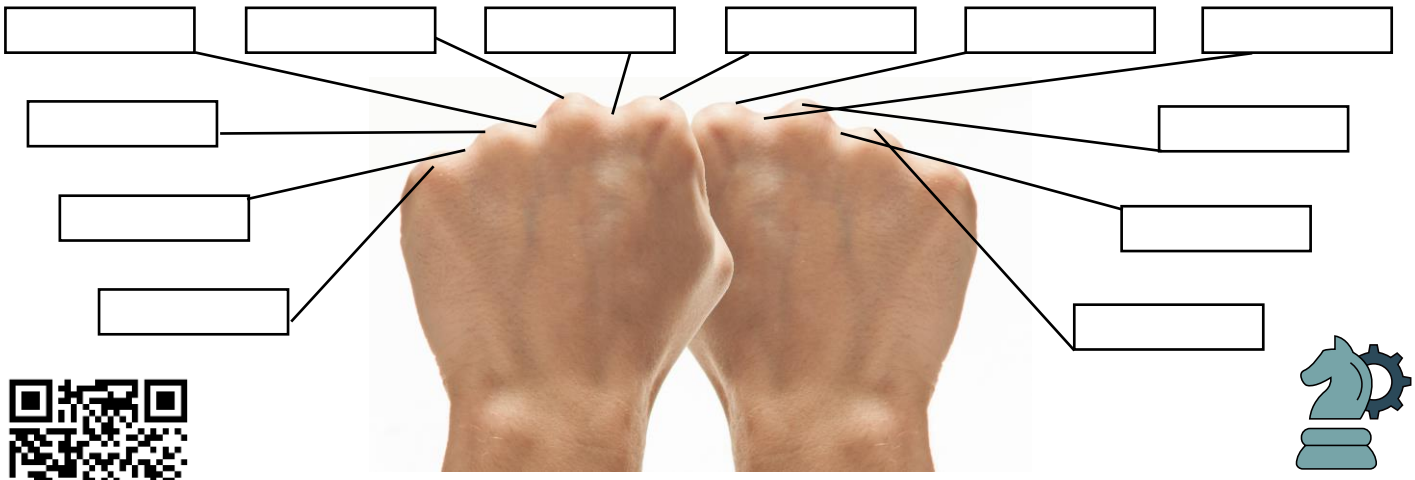
The Calendar

There are 12 months in a year, but how many days are there in each month? Try to complete the following table.

Name of the month	Number of days
January	

Name of the month	Number of days
July	

How can the following picture help you remember how many days make up each month?



Exercise 33

Applying

A

Here is a calendar for the year 2025.

January

Mo	Tu	We	Th	Fr	Sa	Su
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

February

Mo	Tu	We	Th	Fr	Sa	Su
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28		

March

Mo	Tu	We	Th	Fr	Sa	Su
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

April

Mo	Tu	We	Th	Fr	Sa	Su
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

May

Mo	Tu	We	Th	Fr	Sa	Su
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

June

Mo	Tu	We	Th	Fr	Sa	Su
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

July

Mo	Tu	We	Th	Fr	Sa	Su
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

August

Mo	Tu	We	Th	Fr	Sa	Su
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

September

Mo	Tu	We	Th	Fr	Sa	Su
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

October

Mo	Tu	We	Th	Fr	Sa	Su
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

November

Mo	Tu	We	Th	Fr	Sa	Su
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

December

Mo	Tu	We	Th	Fr	Sa	Su
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

(a) Find 1st January 2025. Which day of the week is this?

(b) How many months in 2025 begin on Saturday?

(c) Is 2025 a leap year? How do you know?

(d) How many Saturdays are in September?

(e) Which month is the first in the year with more Fridays than Thursdays?

(f) On which day will Fireworks Night be in 2025?

(g) How many Mondays are there in the year?

(h) Which day will be the final day of January **2026**?

Challenge! 

A

Are there more days in the first six months of a year or the final six months of a year?

School History

Ysgol y Creuddyn was opened on Wednesday, September 2nd, 1981. There were 218 pupils to begin with, including exactly 100 in year seven. The pupils were welcomed by the headmaster Mr. Roland Jones (Year 3); Mrs. Ellen Kent (Year 1); and Mr. Dafydd Whittall (Year 2).

The official opening took place on Wednesday, October 17th, 1984.

Question: Was 1981 a leap year? What about 1984? How do we go about deciding?

Leap Years

- There is a leap year every four years.
- There is one extra day (February 29th) during a leap year.
- There are 366 days in a leap year.
- Each leap year is a multiple of 4. From the first chapter, this means that half of the final two digits needs to be a multiple of 2.

  For 1956, half of 56, 28, is a multiple of 2, so 1956 was a leap year.
  For 1862, half of 62, 31, is not a multiple of 2, so 1862 was not a leap year.

Exercise 34


A
Skill

Decide whether the following years were leap years.

(a) 1936 (b) 1832 (c) 1873 (d) 1990 (e) 1906 (f) 1740 (g) 1808

Decide whether the following years will be leap years.

(h) 2056 (i) 2140 (j) 2562 (k) 3483 (l) 4800 (m) 5136 (n) 13276

Timetables

Exercise 35

A
Applying

(a) What is the length of a television programme that starts at 17:55 and ends at 18:40?

(b) The film started at 21:35. If the film lasted 1 hour 40 minutes, when did it finish?

(c) When cooking a turkey, it requires 20 minutes cooking for each pound of weight and then an extra 20 minutes. You have a 12 pound turkey and need it to be ready by 19:30. When should you start cooking the turkey?

(d) Film A starts at 13:52 and finishes at 16:35. Film B starts at 14:33 and finishes at 16:48. Which film is the longest, and by how much?

(e) A bus leaves Llandudno at 11:35 and reaches Bangor at 12:50. How long was the journey?

(f) Look at the following timetable and answer the questions that follow.

Holyhead	0551	0628	0715	0805	0923	1040	1127
Bangor	0618	0706	0802	0902	1002	1107	1200
Llandudno Junction	0635	0722	0823	0923	1023	1123	1222
Colwyn Bay	0642	0731	0831	0931	1031	1131	1229
Rhyl	0653	0741	0841	0941	1041	1141	1240
Prestatyn	0658	0747	0847	0947	1047	1147	1245
Flint	0712	0800	0900	1000	1100	1200	1259
Chester	0726	0815	0914	1015	1115	1216	1313

(i) What time does the first train reach Llandudno Junction?

(ii) How many minutes does the 0841 from Rhyl take to reach Chester?

(iii) Siwan lives in Colwyn Bay. She works in Prestatyn and starts work at 09:00. Which train should Siwan catch in order to reach work on time?

(iv) Geraint reaches Bangor train station at 10:23. How many minutes does he have to wait until the next train arrives?

(v) Of the seven trains on the timetable, which is the **slowest** in travelling from Holyhead to Chester?

A

Challenge!

Which is the largest: the number of seconds in a week, or the number of minutes in a year?

Exercise 36 (Revision) A

(a) How many minutes are there in 4 hours?

(b) How many years and months make up 35 months?

(c) Change 10:34 p.m. to be in the 24 hour clock.

(d) The clock on the right is three quarters of an hour early. What is the correct time?

(e) How many days are there in April and October combined?

(f) Was 1846 a leap year?

a.m.

(g) The concert finished at ten minutes to ten at night. The concert's length was 2 hours 35 minutes. When did the concert start?

(h) If December 1st was a Monday, what day was December 16th?

(i) Write 'twenty-five minutes to three in the morning' in figures, using the 24 hour clock.

Evaluation

Key Words	Corrections	I am happy with…	I need to revise…

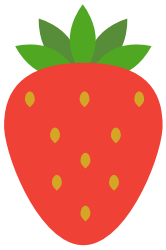
The Refectory

Each dinner time, the refectory serves hot food; salad; sandwiches and different puddings. An extension to the refectory was built during 2014.

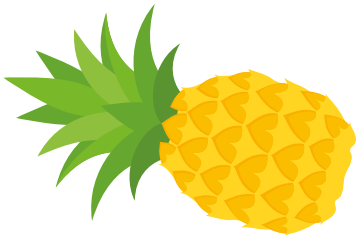
Exercise 37 2 Skill

Add symmetry lines to the following fruits.

(a)

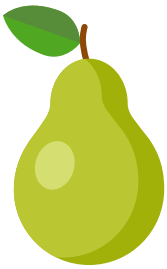


(b)



(c)

(d)



Challenge!

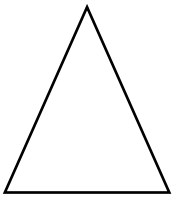
Can you identify the names of each of the fruits above?

Exercise 38 2

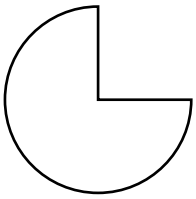
Add symmetry lines to the following diagrams.

(a)

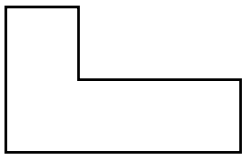
(b)



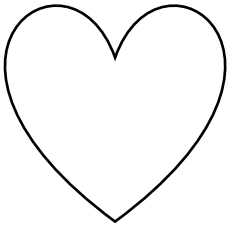
(c)



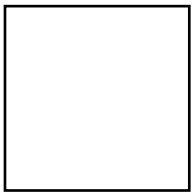
(d)



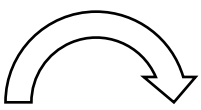
(e)



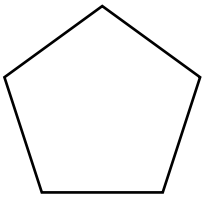
(f)



(g)



(h)



2 Applying

Exercise 39

Classify the following flags according to whether they have (a) vertical symmetry only; (b) horizontal symmetry only; (c) both horizontal and vertical symmetry; (d) no symmetry.

Challenge!

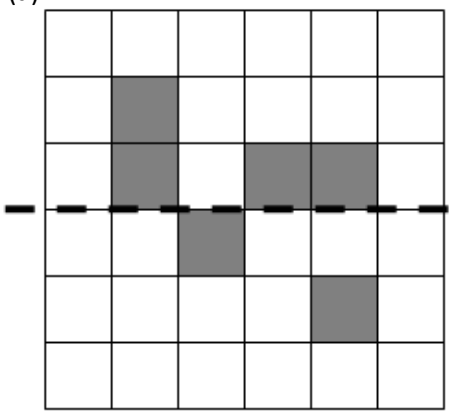
Which countries appear on the above flags?

Skill 2

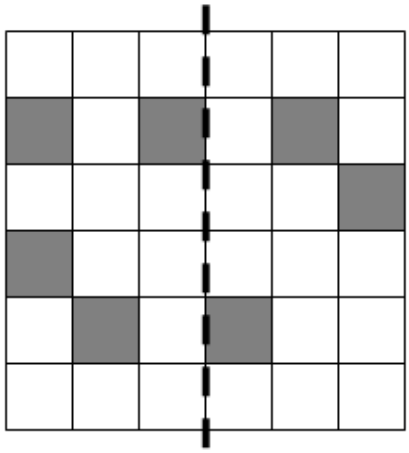
Exercise 40

Shade the least number of squares so that the dotted lines are symmetry lines.

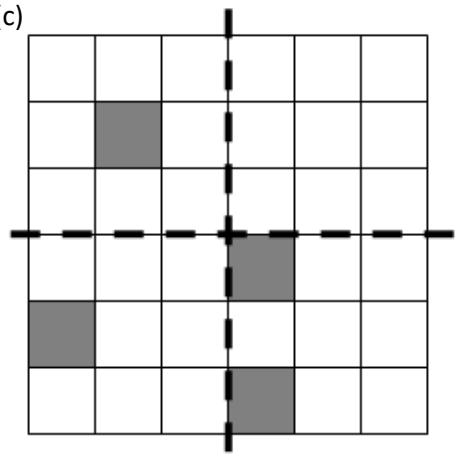
(a)



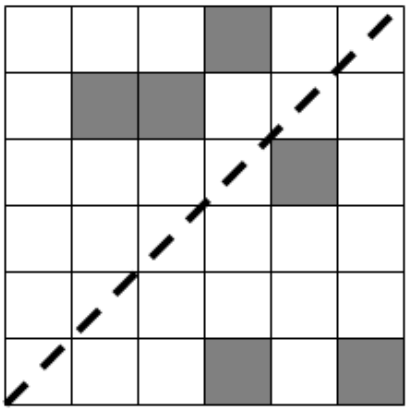
(b)



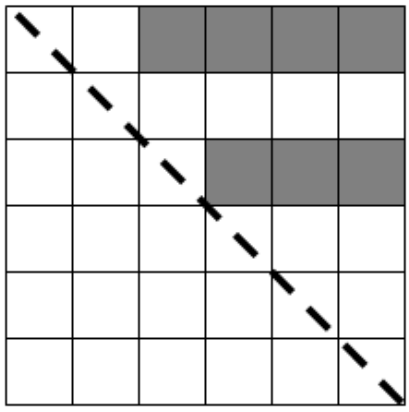
(c)



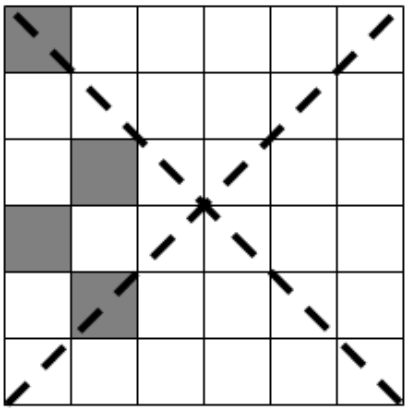
(d)



(e)



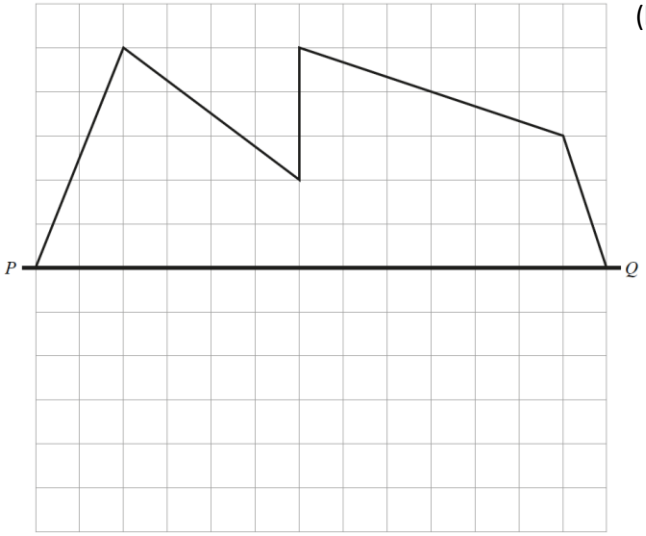
(f)



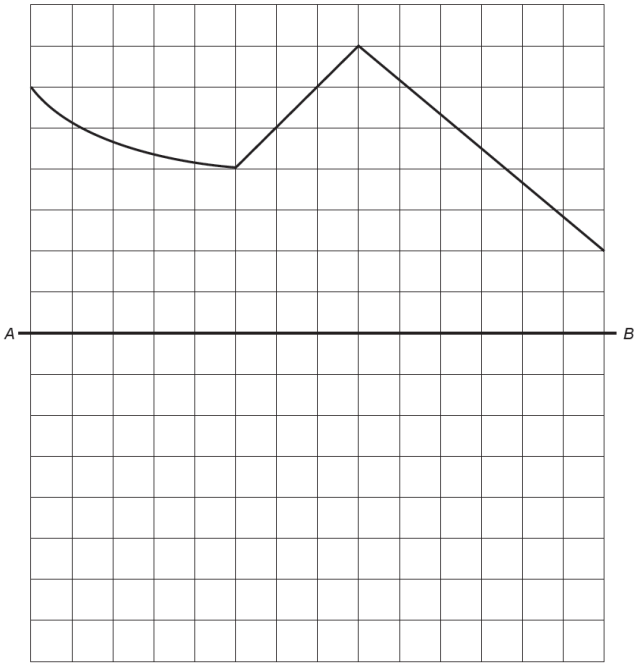
Exercise 41 2

Complete the following shapes so that the horizontal line is a symmetry line.

(a)



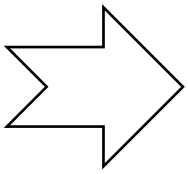
(b)



Exercise 42 (Revision) 2

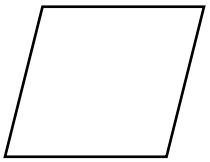
(a) Add symmetry lines to the following diagrams.

(i)



(ii)

(iii)



(b) Explain whether France's flag has any symmetry lines.

(c) How many symmetry lines does a regular hexagon have?

(d) How many symmetry lines does a circle have?

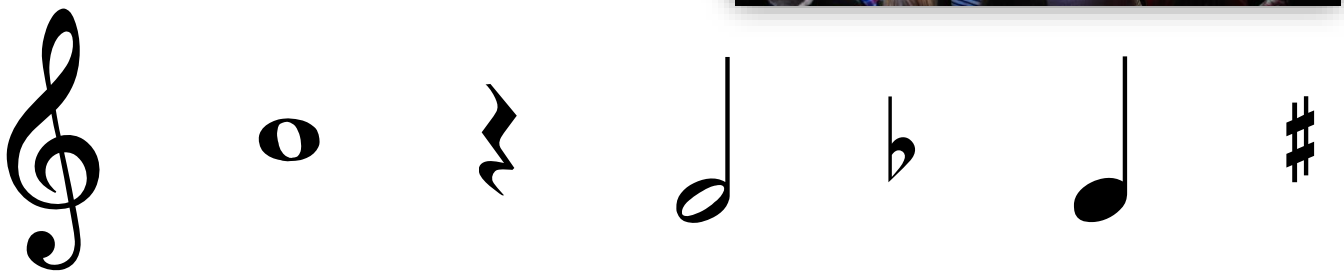
Evaluation

Key Words	Corrections	I am happy with…	I need to revise…

The Eisteddfod

The Eisteddfod is one of the highlights of the school year. The houses Bodysgallen, Penrhyn and Gloddaeth battle against each other in competitions such as the Solo Instrumental; Speaking for a Minute; Solo from a Musical; and Gargling the National Anthem.

Many of the competitions are musical in nature, so it is advantageous to be able to read musical notation. Here are some of the symbols used in musical notation.



Treble clef | Semibreve (4 beats) | Rest | Minim (2 beats) | Flat | Crotchet (1 beat) | Sharp

Imagine rotating these symbols. Which symbols will look exactly the same before you finish a complete rotation?

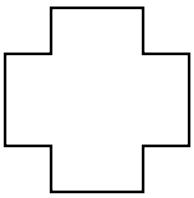
Rotational Symmetry

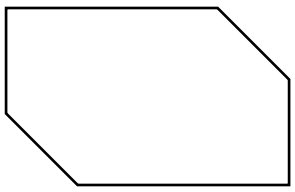
A shape has **rotational symmetry** if it comes to fit onto itself more than once during a complete rotation. The **order of rotational symmetry** is the number of times the shape comes to fit onto itself during the complete rotation. A shape does not have rotational symmetry it if fits onto itself only once.

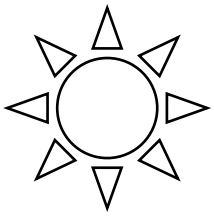
Exercise 43

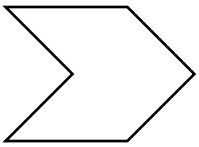
2 Skill

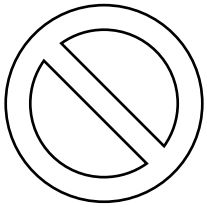
What is the order of rotational symmetry of the following shapes?

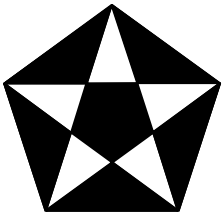
(a) 

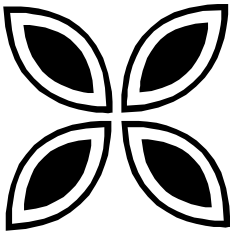
(b) 

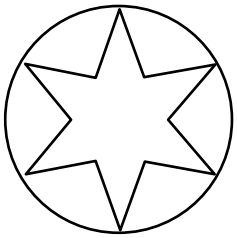
(c) 

(d) 

(e) 

(f) 

(g) 

(h) 

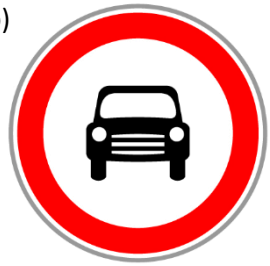
(i) Regular Decagon (j) Square (k) Rectangle (l) Circle

Exercise 44

2 Applying

What is the order of rotational symmetry of the following road signs?

(a) 

(b) 

(c) 

(d) 

(e) 

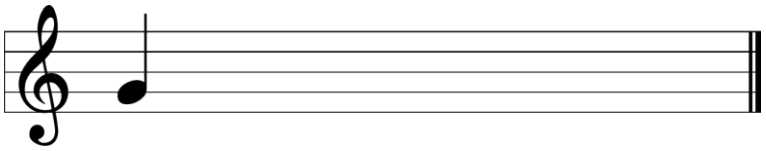
(f) 

(g) 

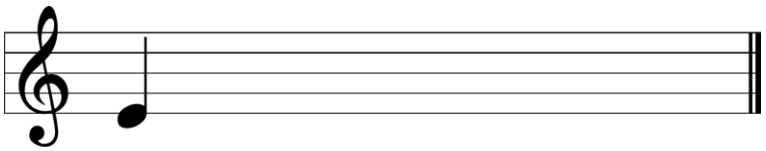
(h) 

Writing Music

It is possible to write music on a **five line musical stave**. The location of a symbol like a crotchet tells the reader which note to play. For example, the following stave shows a G note.



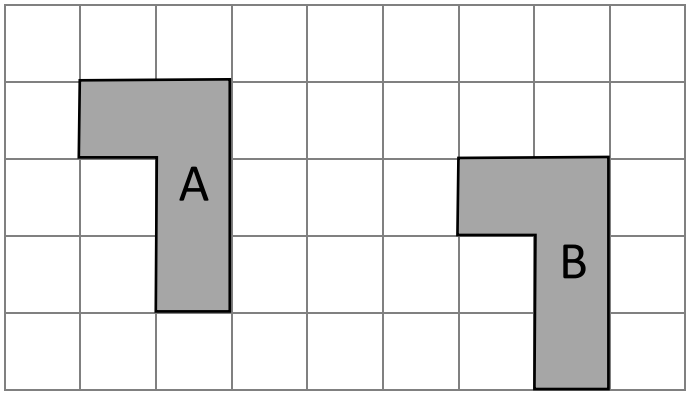
By moving the crotchet up or down, a different note can be played. For example, moving the crotchet down one line changes the note to be an E.



The mathematical name for moving a symbol is **translation**.

Translations

In the diagram on the right, the shape A has been moved 5 squares to the right and 1 square down in order to form the shape B.



Exercise 45

Skill 2

Translate the following shapes using the instructions below.

(a) Translate the shape 4 units to the right and 3 units up.

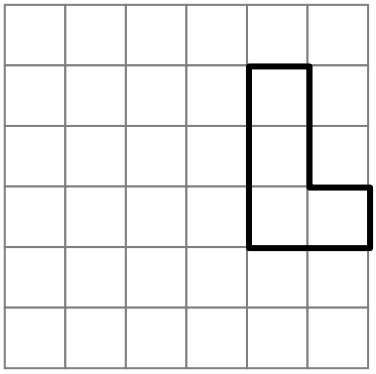
(b) Translate the shape 3 units to the left and 7 units up.

(c) Translate the shape 8 units to the right and 2 units down.

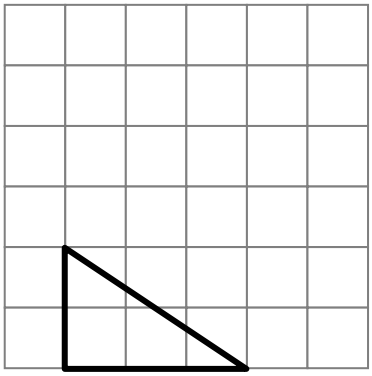
(d) Translate the shape 5 units up.

(e) Translate the shape 2 units down and 4 units to the left.

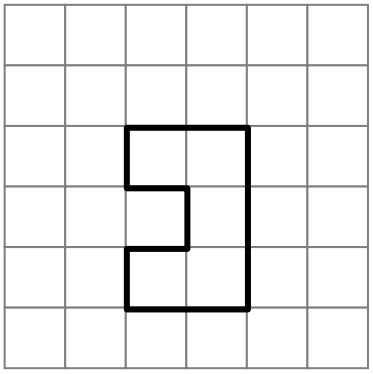
(a)



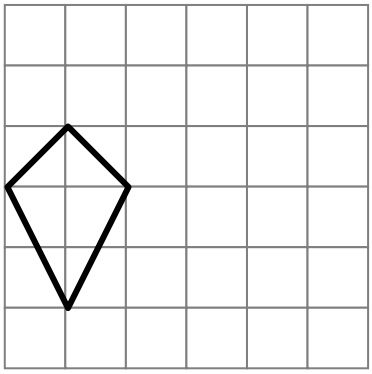
(b)



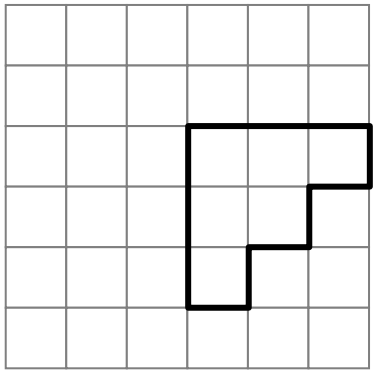
(c)



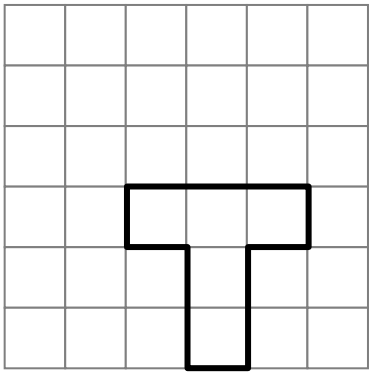
(d)



(e)



(f)

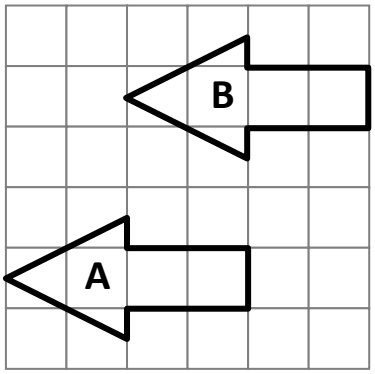


Exercise 46

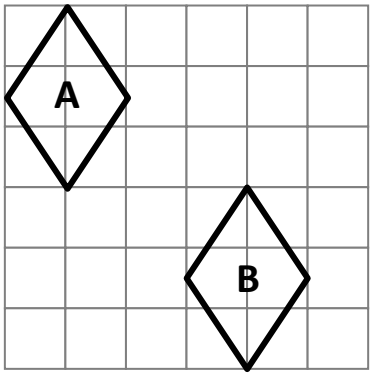
2

Write down the translation that translates the shape **A** to the shape **B** in the following diagrams.

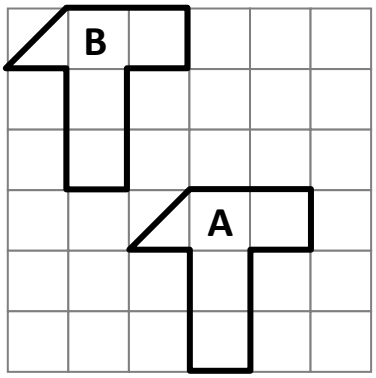
(a)



(b)

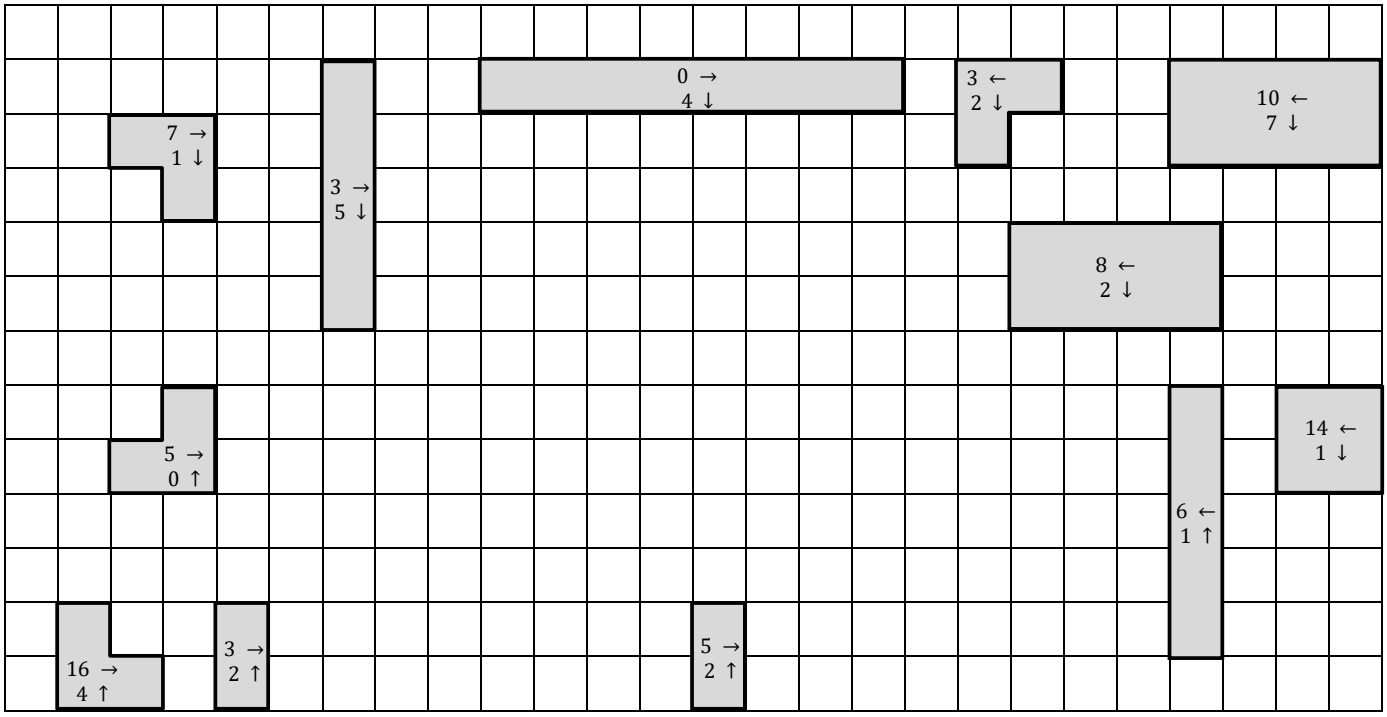


(c)



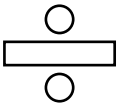
Exercise 47 2

Translate the following shapes to form one big shape...

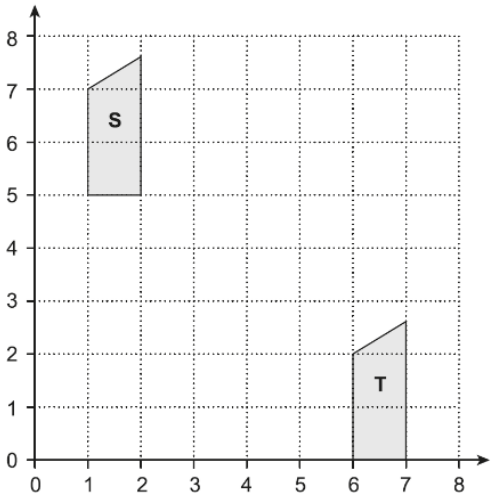


Exercise 48 (Revision) 2

(a) What is the order of rotational symmetry of the division sign shown on the right?



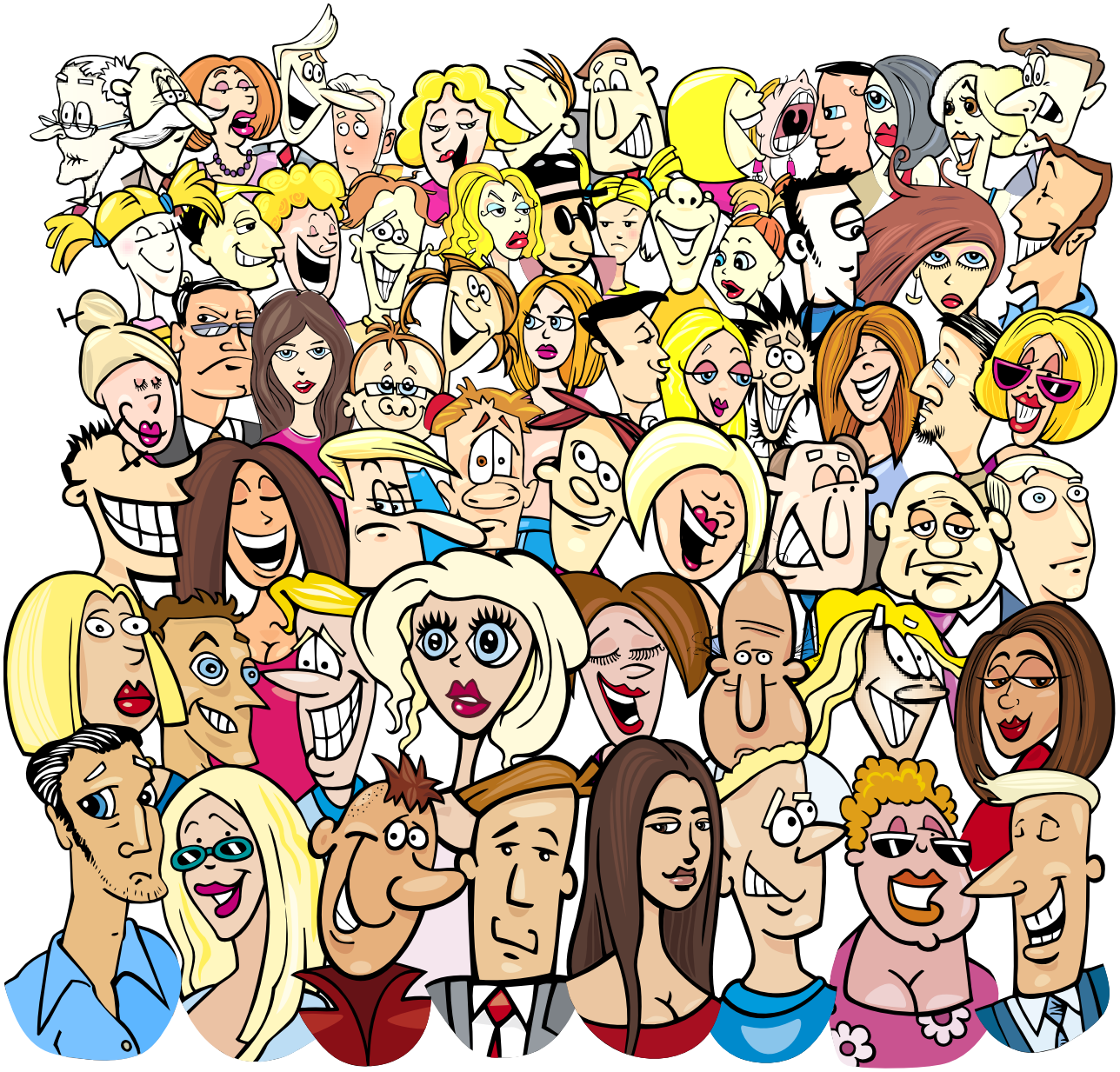
(b) Which translation translates the shape **S** to the shape **T** in the diagram on the right?



Evaluation

Key Words	Corrections	I am happy with…	I need to revise…

Puzzle: How many people can be seen in the picture?



Welcome to Ysgol y Creuddyn

Reflection Sheet

Name: .....

Percentage in the test: .....

	I know this. 	I need to revise this. 	Question in the test:	Correct in the test?
I know the meaning of the word '**multiple**'.			5, 9	
I know how to decide if a number is a multiple of **2.**			1	
I know how to decide if a number is a multiple of **3.**			5	
I know how to decide if a number is a multiple of **5.**			9	
I know how to decide if a number is a multiple of **7.**			9	
I know how to decide if a number is a multiple of **9.**			12	
I know how to complete a **Venn diagram.**			12	
I know the **names of the shapes** with between 3 and 10 sides.			2	
I know the difference between a **regular polygon** and an **irregular polygon.**			14	
I know the difference between a **vertical line** and a **horizontal line.**			7	
I know the difference between **parallel lines** and **perpendicular lines.**			7	
I know the difference between an **even number** and an **odd number.**			1, 3	
I can calculate a **square number** such as 7^2.			9, 11	
I can calculate a **cube number** such as 6^3.			11	
I know the difference between times in the **12-hour clock** and times in the **24-hour clock.**			4, 5	
I can read the time shown on an **analogue** clock.			4	
I know the **number of days** in each **month** of the year.			5	
I know how to decide whether a year is a **leap year.**			13	
I can answer questions that use a **timetable.**			17	
I can add **symmetry lines** to different shapes.			8	
I can complete a shape to ensure it is **symmetrical.**			15	
I know how to decide what **order of symmetry** a shape has.			10	
I know how to **translate** shapes.			16	