



# Maths

## Coins in the Classroom

# Coin Denominations

In the United Kingdom we have eight denominations, or types of coin.



# Worksheet

## Sums



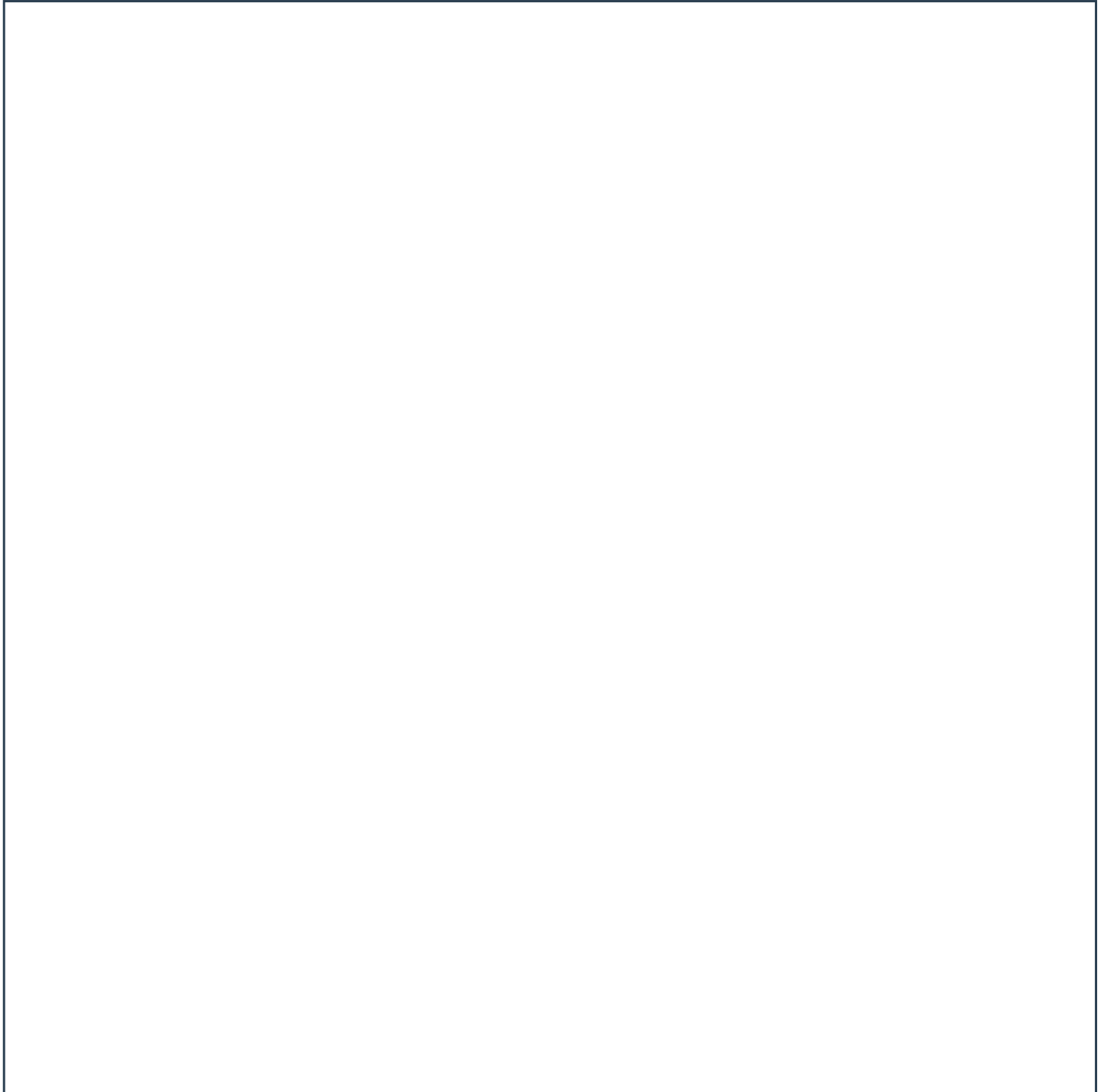
# The Shape of Coins

Here are some examples of coins of different shapes from around the world.



# Worksheet

Coins don't have to be round. What different shapes do you think we could use for coins?



# Worksheet

We all need coins to do certain things, for example, fit in our pockets. Can you think what other things coins need to be able to do?

Coins must not be  
**too big**

Coins must not be  
too small

# The Shape of Coins

There is something special about 20p and 50p coins, do you know what it is?



Take a 20p or 50p and set up a slope ...

Balance the coin on its edge at the top of the slope and let go ...

Even though the coins are not round, they still roll.

Can you work out why?

# Fact File

It is important for coins to roll so that they can be used in vending machines and parking meters.



Some countries, rather than having different shaped coins, make their coins into rings.



The 20p and the 50p coins roll because they are a special shape, known as an equilateral curve heptagon.



# Fact File

## The 50p

The 50p (and the 20p) are in the shape of an equilateral curve heptagon. This means that every side of the coin is the same length (equilateral), the line between each of the points is rounded (curved), and the two coins have seven sides (a heptagon).

This unusual shape means they are easy to tell apart from round coins by sight and feel, which is important for those who are blind or visually impaired. The constant breadth allows them to roll in vending machines. The 50p was first introduced in 1969, with the smaller version we use today being introduced in 1997.

## Coin Measurements

	1p	2p	5p	10p	20p	50p
Diameter	20.30mm	25.90mm	18.00mm	24.50mm	21.40mm	27.30mm
Weight	3.56g	7.12g	3.25g	6.50g	5.00g	8.00g
Thickness	1.52mm (before 1992) 1.65mm (after)	1.85mm (before 1992) 2.03mm (after)	1.70mm (before 2011) 1.96mm (after)	1.85mm (before 2011) 2.07mm (after)	1.70mm	1.78mm

### Did You Know?

You can only use certain coins to pay for certain amounts. For example, 20 pence is the most you could pay for using only 1p or 2p coins. It is legal to pay a bill or settle a debt of up to £5 with 5p and 10p coins, up to £10 with 20p or 50p coins, and you can pay any amount with £1 or £2 coins.

# Fact File

## Why be Accurate?

Accuracy is very important when making coins. Each UK coin should match its specification for weight, thickness and diameter. If it does not match its specification then it may not work in vending machines.

## The Trial of the Pyx



For over 700 years coins produced by The Royal Mint have been independently checked in a proceeding known as the Trial of the Pyx, which takes its name from the 'pyx' or box in which the sample coins set aside for testing were kept.

Today the Trial consists of an examination of coins by an independent jury. The purpose is to check that the precious metal and circulating coins made by The Royal Mint are of proper weight, diameter and composition required by law.

The Trial is undertaken annually and is carried out by the Goldsmiths' Company of the City of London, who provide a jury of Freemen of the Company. The jury is sworn in by the Queen's Remembrancer, a senior judge, who presides over the Trial in accordance with directions issued by the Treasury.

The jury first check the sample coins in bulk, as well as some individual specimens, then they weigh the coins in bulk, as well as some individual specimens, to make sure that the weight of the coins is within the limits allowed by law. Assays (metal tests) are then carried out to test the fineness or composition of the metal. The results are compared with standard trial plates (metal known to be the correct composition). The diameters of selected coins are also measured.

Three months after the Trial the verdict is given to the Queen's Remembrancer in the presence of the Master of the Mint (Chancellor of the Exchequer) or the Deputy Master (Chief Executive of The Royal Mint).

# How to Measure Coins

## Diameter

Use your ruler to measure the widest point of the coin. Most of the coins in the UK are circular, however the 50p and 20p are not – they have seven sides. To measure across a 50p you need to take your ruler and measure from one of the points on the coin straight across to the flat side opposite. Do this at least three times to make sure your measurements are accurate.

### DID YOU KNOW?

The 50p and 20p coins roll because the distance between the opposite sides is always the same.

## Area

Use a sheet of squared paper to measure the area. Draw around your coin using a pencil and then count the number of squares it covers. Remember to count whole squares first and half squares second. Repeat your count three times and record your answer in  $\text{cm}^2$ .

## Circumference

You will need to use a piece of string to measure the circumference of the coins. Carefully wrap the string around the edge of the coin and mark on the string where the end meets. Then measure the string against a ruler to get your measurement. Repeat this three times – be careful to make sure the string is not too loose!

## Weight

Weigh one coin at a time. You will need to use scales that show decimal numbers. Clear the scales (so they are showing zero) and then place the coin onto the scales to weigh it. Read the display carefully and then take the coin off. Repeat this three times for every coin you need to weigh. Record the weight of the coin in grams.

## Thickness

Measuring the thickness of coins can be a bit tricky because some of them are very thin. One way to measure the thickness accurately is to make a stack of coins by stacking five or ten coins on top of each other. You then need to measure the stack with a ruler, so that you know the thickness of all five (or ten) coins together. After you have done this divide your answer by the number of coins in the stack. This will give you the answer you need for one coin. You might need to use a calculator to help you.

# Worksheet

You will need a ruler and scales.

Coin	Diameter /mm	Thickness /mm	Weight /g
1p			
2p			
5p			
10p			
20p			
50p			
£1			
£2			

# Worksheet



A 2p coin weighs twice as much as a 1p coin, and the 10p coin weighs twice as much as the 5p coin. This is a weight to value relationship.

1. What advantages are there to having a 2p coin that weighs twice as much as a 1p coin?

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2. What disadvantages are there?

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3. Look at your results.  
Is this the same for the 20p and 50p?

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4. Can you work out how much a halfpenny (a coin we no longer use) would have weighed?

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# Fact File

## The Equilateral Curve Heptagon

The 20p and the 50p coins roll because they are a special shape, known as an equilateral curve heptagon.

If you look carefully you can see that this is because the sides of the shape are slightly curved, not flat like you might expect.

This means that a shape like a hexagon with flat sides won't roll, but these coins will.

Britain was the first country in the world to use this shape for coins.

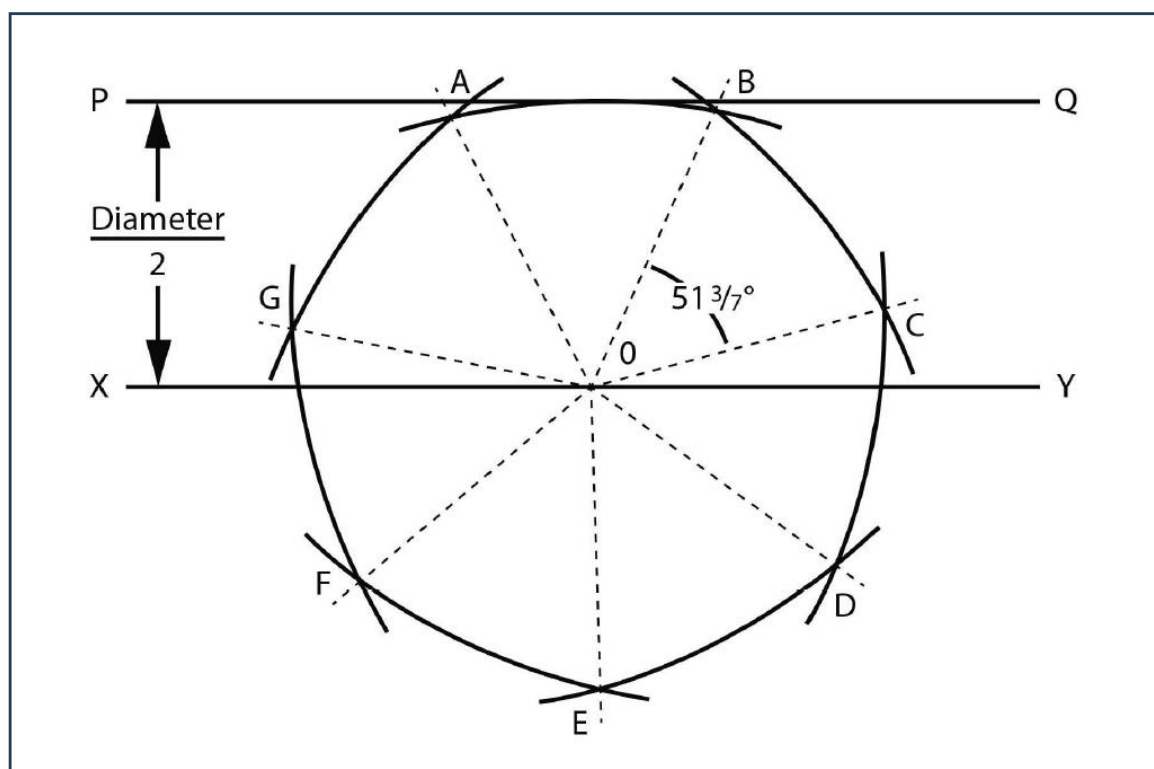


# Worksheet 1/2

## Draw an equilateral curve heptagon

The equilateral curve heptagon is a tricky shape to draw. Read the instructions below and then have a go yourself. You will need a ruler, a compass, a protractor and a pencil.

Equilateral curve heptagon

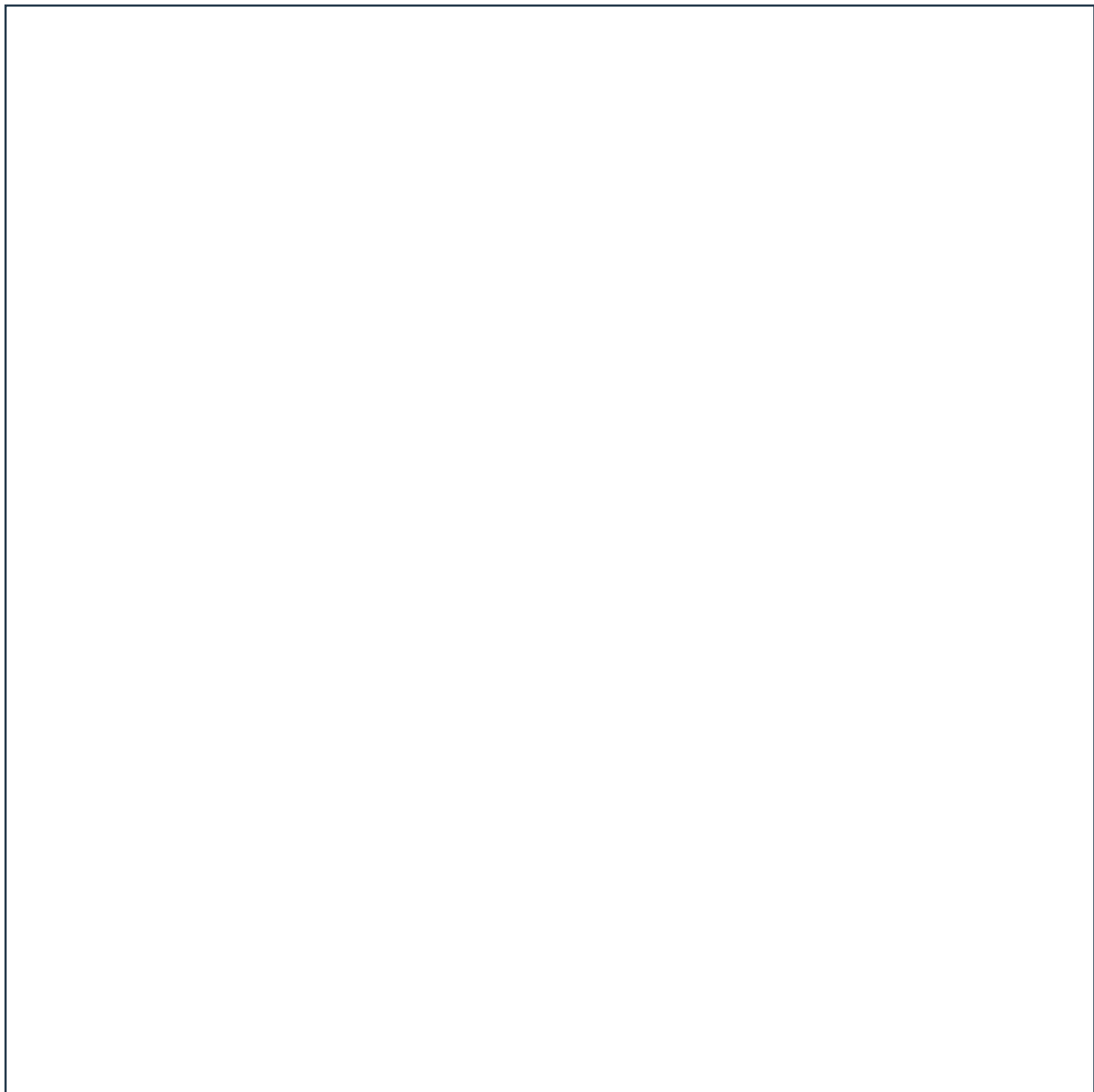


1. Draw a line 8cm long. Label the ends X and Y and mark the centre O.
2. Draw a parallel line 3cm above and label it PQ.
3. Line the centre of your protractor up with O and then mark every  $51\frac{3}{7}^\circ$ .
4. Join each of your points up with the centre O.
5. Label your lines A-G copying the diagram carefully.
6. Set your compass to 6cm.
7. Put the point of your compass where your line A crosses your line PQ, then draw a curve between your lines E and D.
8. Next put the point of your compass on your line E and draw a curve between A and B.
9. Repeat this with line D and so on until you have completed your shape.
10. When you have finished rub out your connecting lines to leave you with your equilateral curve heptagon.

# Worksheet 2/2

Draw an equilateral curve heptagon

My equilateral curve heptagon





The content in this pack was developed by the team at The Royal Mint Museum. For more information on these resources, including additional teaching materials and in-depth teachers' notes, please visit [royalmintmuseum.org.uk/learning](https://royalmintmuseum.org.uk/learning)

For a more immersive learning experience, online education sessions with The Royal Mint Museum are available upon request. Complete the online form at [royalmintmuseum.org.uk/learning](https://royalmintmuseum.org.uk/learning) to request a booking and we will be in touch to confirm the details.



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