

Summer Scheme of Learning

Year 3

#MathsEveryoneCan



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Meet the Characters

Children love to learn with characters and our team within the scheme will be sure to get them talking and reasoning about mathematical concepts and ideas. Who's your favourite?



Teddy



Rosie



Mo



Eva



Alex



Jack



Whitney



Amir



Dora



Tommy



Dexter



Ron



Annie

| | Week 1 | Week 2 | Week 3 | Week 4 | Week 5 | Week 6 | Week 7 | Week 8 | Week 9 | Week 10 | Week 11 | Week 12 |
|--------|-------------------------------------|--------|--------|----------------------------------|------------|--------|-----------------------------------|--------|-------------------------------------|-------------------|---------|---------------|
| Autumn | Number: Place Value | | | Number: Addition and Subtraction | | | | | Number: Multiplication and Division | | | Consolidation |
| Spring | Number: Multiplication and Division | | | Measurement: Money | Statistics | | Measurement: Length and Perimeter | | | Number: Fractions | | Consolidation |
| Summer | Number: Fractions | | | Measurement: Time | | | Geometry: Properties of Shape | | Measurement: Mass and Capacity | | | Consolidation |

White
Rose
Maths

Summer - Block 1

Fractions

Year 3

Overview

Small Steps

NC Objectives

- ▶ Equivalent fractions (1)
- ▶ Equivalent fractions (2)
- ▶ Equivalent fractions (3)
- ▶ Compare fractions
- ▶ Order fractions
- ▶ Add fractions
- ▶ Subtract fractions

Recognise and show, using diagrams, equivalent fractions with small denominators.
Compare and order unit fractions, and fractions with the same denominators.
Add and subtract fractions with the same denominator within one whole [for example, $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$]
Solve problems that involve all of the above.

Equivalent Fractions (1)

Notes and Guidance

Children begin by using Cuisenaire or number rods to investigate and record equivalent fractions. Children then move on to exploring equivalent fractions through bar models.

Children explore equivalent fractions in pairs and can start to spot patterns.

Mathematical Talk

If the ___ rod is worth 1, can you show me $\frac{1}{2}$? How about $\frac{1}{4}$? Can you find other rods that are the same? What fraction would they represent?

How can you fold a strip of paper into equal parts?
What do you notice about the numerators and denominators?
Do you see any patterns?

Can a fraction have more than one equivalent fraction?

Varied Fluency

 The pink Cuisenaire rod is worth 1 whole.






Which rod would be worth $\frac{1}{4}$?

Which rods would be worth $\frac{2}{4}$?

Which rod would be worth $\frac{1}{2}$?

Use Cuisenaire to find rods to investigate other equivalent fractions.

 Use two strips of equal sized paper. Fold one strip into quarters and the other into eighths. Place the quarters on top of the eighths and lift up one quarter, how many eighths can you see? How many eighths are equivalent to one quarter? Which other equivalent fractions can you find?

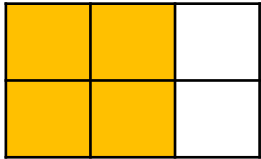
 Using squared paper, investigate equivalent fractions using equal parts. e.g. $\frac{1}{4} = \frac{2}{8}$ 

Start by drawing a bar 8 squares along. Label each square $\frac{1}{8}$
Underneath compare the same length bar split into four equal parts. What fraction is each part now?

Equivalent Fractions (1)

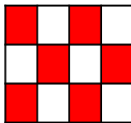
Reasoning and Problem Solving

Explain how the diagram shows both $\frac{2}{3}$ and $\frac{4}{6}$



The diagram is divided into six equal parts and four out of the six are yellow. You can also see three **columns** and two columns are yellow.

Which is the odd one out? Explain why



This is the odd one out because the other fractions are all equivalent to $\frac{1}{2}$



Teddy makes this fraction:



Mo says he can make an equivalent fraction with a denominator of 9

Dora disagrees. She says it can't have a denominator of 9 because the denominator would need to be double 3



Who is correct? Who is incorrect? Explain why.

Mo is correct. He could make three ninths which is equivalent to one third.



Dora is incorrect. She has a misconception that you can only double to find equivalent fractions.

Equivalent Fractions (2)

Notes and Guidance

Children use Cuisenaire rods and paper strips alongside number lines to deepen their understanding of equivalent fractions.

Encourage children to focus on how the number line can be divided into different amounts of equal parts and how this helps to find equivalent fractions e.g. a number line divided into twelfths can also represent halves, thirds, quarters and sixths.

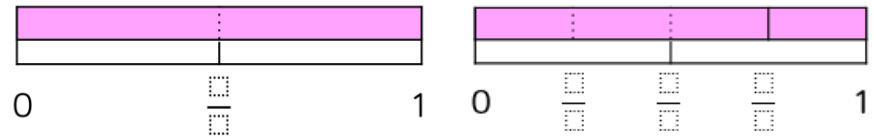
Mathematical Talk

The number line represents 1 whole, where can we see the fraction $\frac{1}{2}$? Can we see any equivalent fractions?

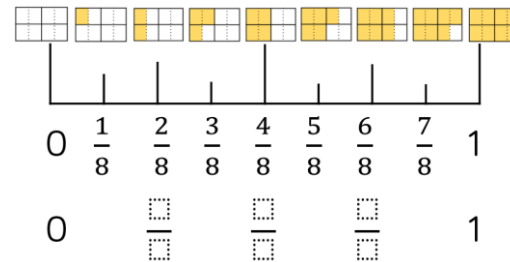
Look at the number line divided into twelfths. Which unit fractions can you place on the number line as equivalent fractions? e.g. $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}$ etc. Which unit fractions are not equivalent to twelfths?

Varied Fluency

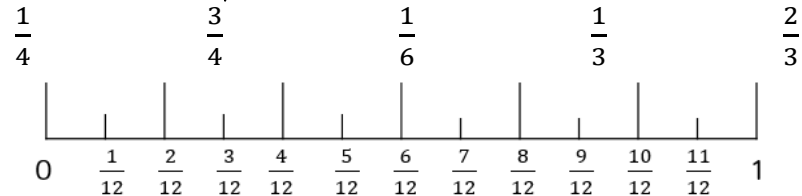
- Use the models on the number line to identify the missing fractions. Which fractions are equivalent?



- Complete the missing equivalent fractions.



- Place these equivalent fractions on the number line.



Are there any other equivalent fractions you can identify on the number line?

Equivalent Fractions (2)

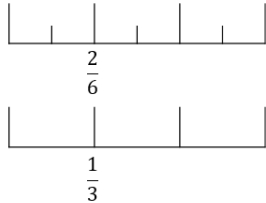
Reasoning and Problem Solving

Alex and Tommy are using number lines to explore equivalent fractions.

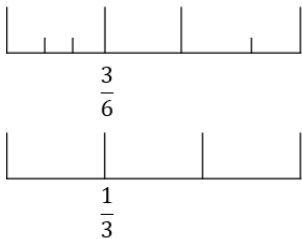


$$\frac{2}{6} = \frac{1}{3}$$

Alex



Tommy

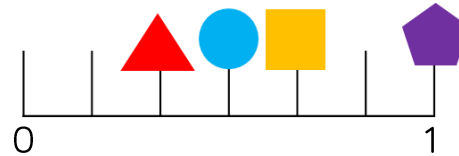


$$\frac{3}{6} = \frac{1}{3}$$



Who do you agree with? Explain why.





Alex is correct. Tommy's top number line isn't split into equal parts which means he cannot find the correct equivalent fraction.







Use the clues to work out which fraction is being described for each shape.

- My denominator is 6 and my numerator is half of my denominator.
- I am equivalent to $\frac{4}{12}$
- I am equivalent to one whole
- I am equivalent to $\frac{2}{3}$

Can you write what fraction each shape is worth? Can you record an equivalent fraction for each one?

| | | | |
|---|---|---|---|
|  | = |  | = |
|  | = |  | = |

- Circle
- Triangle
- Square
- Pentagon

| | | |
|---|---|--------------------------------|
|  | = | $\frac{1}{3}$ or $\frac{2}{6}$ |
|  | = | $\frac{1}{2}$ or $\frac{3}{6}$ |
|  | = | $\frac{2}{3}$ or $\frac{4}{6}$ |
|  | = | $\frac{6}{6}$ or $\frac{3}{3}$ |

Accept other correct equivalences

Equivalent Fractions (3)

Notes and Guidance

Children use proportional reasoning to link pictorial images with abstract methods to find equivalent fractions. They look at the links between equivalent fractions to find missing numerators and denominators.

Children look for patterns between the numerators and denominators to support their understanding of why fractions are equivalent e.g. fractions equivalent to a half have a numerator that is half the denominator.

Mathematical Talk

Why do our times tables help us find equivalent fractions?


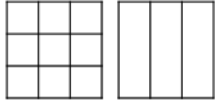
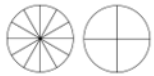
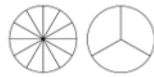
Can we see a pattern between the fractions?

Look at the relationship between the numerator and denominator, what do you notice? Does an equivalent fraction have the same relationship?

If we add the same number to the numerator and denominator, do we find an equivalent fraction? Why?

Varied Fluency

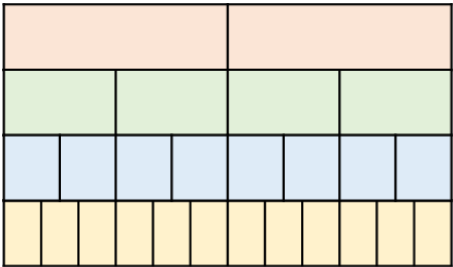
Complete the table. Can you spot any patterns?

| Pictorial representation | Fraction | Words |
|---|--|--|
|  | $\frac{6}{8} = \frac{3}{4}$ | Six eighths is equivalent to three quarters |
|  | $\frac{1}{3} = \frac{\square}{9}$ | _____ is equivalent to _____ |
|  | $\frac{\square}{4} = \frac{\square}{12}$ | Three twelfths is equivalent to _____ quarters |
|  | $\frac{4}{12} = \frac{\square}{\square}$ | _____ is equivalent to _____ |

Use the fraction wall to complete the equivalent fractions.

$$\frac{1}{2} = \frac{\square}{4} = \frac{\square}{8} = \frac{6}{\square}$$

$$\frac{1}{4} = \frac{2}{\square} = \frac{3}{\square}$$



Equivalent Fractions (3)

Reasoning and Problem Solving

Always, sometimes, never.

If a fraction is equivalent to one half, the denominator is double the numerator.

Prove it.

Can you find any relationships between the numerator and denominator for other equivalent fractions?

Always, children could also think of the numerator as being half of the denominator.

Dora has shaded a fraction.



She says,



I am thinking of an equivalent fraction to the shaded fraction where the numerator is 9

Is this possible?
Explain why.

This is impossible. Dora may have mistaken the numerator for the denominator and be thinking of $\frac{6}{9}$ which is equivalent to $\frac{2}{3}$

Compare Fractions

Notes and Guidance

Children compare unit fractions or fractions with the same denominator.

For unit fractions, children's natural tendency might be to say that $\frac{1}{2}$ is smaller than $\frac{1}{4}$ as 2 is smaller than 4. Discuss how dividing something into more equal parts makes each part smaller.

Mathematical Talk

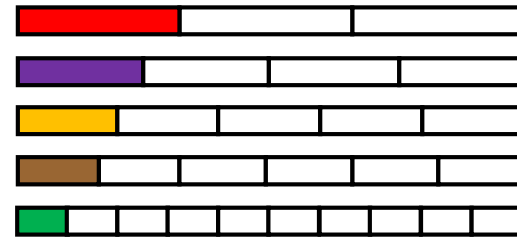
What fraction of the strip is shaded? What fraction of the strip is not shaded?

Why is it important that the strips are the same length and are lined up underneath each other?

Can you think of a unit fraction that is smaller than $\frac{1}{10}$? Can you think of a unit fraction that is larger than $\frac{1}{3}$?

Varied Fluency

Use $>$, $<$ or $=$ to compare the fractions.



$$\frac{1}{10} \bigcirc \frac{1}{4}$$

$$\frac{1}{3} \bigcirc \frac{1}{6}$$

$$\frac{1}{5} \bigcirc \frac{1}{4}$$

When the numerators are the same, the _____ the denominator, the _____ the fraction.

Use paper strips to compare the fractions using $>$, $<$ or $=$

$$\frac{3}{4} \bigcirc \frac{1}{4}$$

$$\frac{1}{6} \bigcirc \frac{5}{6}$$

$$\frac{3}{8} \bigcirc \frac{5}{8}$$

When the denominators are the same, the _____ the numerator, the _____ the fraction.

Compare Fractions

Reasoning and Problem Solving



I know that $\frac{1}{3}$ is larger than $\frac{1}{2}$ because 3 is larger than 2

Do you agree with Dora?
Explain how you know.

Complete the missing denominator.
How many different options can you find?

$$\frac{1}{2} > \frac{1}{\boxed{1}} > \frac{1}{10}$$

$\boxed{}$

$\frac{1}{3}$ is smaller because it is split into 3 equal parts, rather than 2 equal parts. Children could draw a bar model to show this.

Examples could include $\frac{1}{3}$, $\frac{1}{4}$ etc.

Here are three fractions.

$$\frac{3}{8} \quad \frac{3}{5} \quad \frac{1}{8}$$

Which fraction is the largest? How do you know?

Which fraction is the smallest? How do you know?

$\frac{3}{5}$ is the largest- when the numerators are the same, the smaller the denominator the larger the fraction. Children could also explain that $\frac{3}{5}$ is the only fraction larger than a half. $\frac{1}{8}$ is the smallest- when the denominators are the same, the smaller the numerator, the smaller the fraction.

Order Fractions

Notes and Guidance

Children order unit fractions and fractions with the same denominator. They use bar models and number lines to order the fractions and write them in ascending and descending order.

Continue to encourage children to use stem sentences to explain why they can compare fractions when the numerators or the denominators are the same.

Mathematical Talk

How many equal parts has the whole been divided in to?

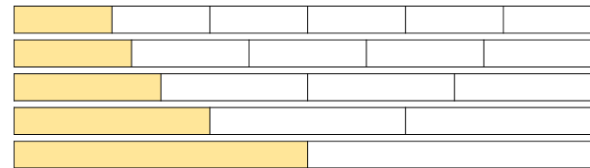
How many equal parts need shading?

Which is the largest fraction? Which is the smallest fraction?

Which fractions are the hardest to make as paper strips? Why do you think they are harder to make?

Varied Fluency

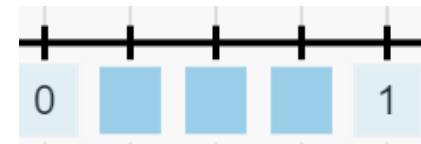
- Divide strips of paper into halves, thirds, quarters, fifths and sixths and colour in one part of each strip.
Now order the strips from the smallest to the largest fraction.



When the numerators are the same, the _____ the denominator, the _____ the fraction.

- Place the fractions on the number line.

$$\frac{2}{4} \quad \frac{3}{4} \quad \frac{1}{4}$$



- Order the fractions in descending order.

$$\frac{3}{8} \quad \frac{5}{8} \quad \frac{1}{8} \quad \frac{8}{8} \quad \frac{7}{8}$$

Order Fractions

Reasoning and Problem Solving



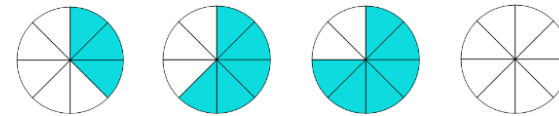
When the denominators are the same, the larger the numerator, the smaller the fraction.

Is Jack correct?
Prove it.

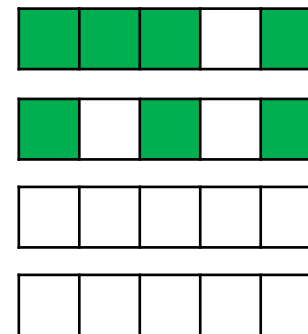
Jack is incorrect. When the denominators are the same, the larger the numerator the larger the fraction. Children could prove this using bar models or strips of paper etc.

Shade the blank diagrams so the fractions are ordered correctly.

Fractions in ascending order



Fractions in descending order



Either 7 or 8 parts shaded.

Either 2 and 1 parts shaded or 1 and 0 parts shaded.

Add Fractions

Notes and Guidance

Children use practical equipment and pictorial representations to add two or more fractions with the same denominator where the total is less than 1

They understand that we only add the numerators and the denominators stay the same.

Mathematical Talk

Using your paper circles, show me what $\frac{1}{4} + \frac{1}{4}$ is equal to.
How many quarters in total do I have?

How many parts is the whole divided into?

How many parts am I adding?

What do you notice about the numerators?

What do you notice about the denominators?

Varied Fluency

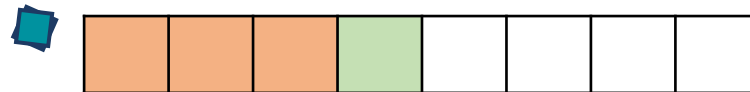
Take a paper circle. Fold your circle to split it into 4 equal parts. Colour one part red and two parts blue. Use your model to complete the sentences.

_____ quarter is red.

_____ quarters are blue.

_____ quarters are coloured in.

Show this as a number sentence. $\frac{\square}{4} + \frac{\square}{4} = \frac{\square}{4}$



We can use this model to calculate $\frac{3}{8} + \frac{1}{8} = \frac{4}{8}$

Draw your own models to calculate

$$\frac{1}{5} + \frac{2}{5} = \frac{\square}{5}$$

$$\frac{2}{7} + \frac{3}{7} + \frac{1}{7} = \frac{\square}{7}$$

$$\frac{7}{10} + \frac{\square}{10} = \frac{9}{10}$$

Eva eats $\frac{5}{12}$ of a pizza and Annie eats $\frac{1}{12}$ of a pizza.
What fraction of the pizza do they eat altogether?

Add Fractions

Reasoning and Problem Solving

Rosie and Whitney are solving:

$$\frac{4}{7} + \frac{2}{7}$$

Rosie says,



The answer is $\frac{6}{7}$

Whitney says,



The answer is $\frac{6}{14}$

Who do you agree with?
Explain why.

Rosie is correct. Whitney has made the mistake of also adding the denominators. Children could prove why Whitney is wrong using a bar model or strip diagram.

Mo and Teddy share these chocolates.



They both eat an odd number of chocolates.

Complete this number sentence to show what fraction of the chocolates they each could have eaten.

$$\frac{\square}{\square} + \frac{\square}{\square} = \frac{12}{12}$$

Possible answers:

$$\frac{1}{12} + \frac{11}{12}$$

$$\frac{3}{12} + \frac{9}{12}$$

$$\frac{5}{12} + \frac{7}{12}$$

(In either order)

Subtract Fractions

Notes and Guidance

Children use practical equipment and pictorial representations to subtract fractions with the same denominator within one whole.

They understand that we only subtract the numerators and the denominators stay the same.

Mathematical Talk




What fraction is shown first? Then what happens? Now what is left? Can we represent this in a number story?

Which models show take away? Which models show finding the difference? What's the same? What's different? Can we represent these models in a number story?

Can you partition $\frac{9}{11}$ in a different way?


Varied Fluency


Eva is eating a chocolate bar. Fill in the missing information.


| First | Then | Now |
|---|---|---|
|  |  |  |
| $\frac{\square}{\square}$ | $\frac{\square}{\square} - \frac{\square}{\square}$ | $\frac{\square}{\square} - \frac{\square}{\square} = \frac{\square}{\square}$ |

Can you write a number story using 'first', 'then' and 'now' to describe your calculation?

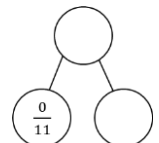
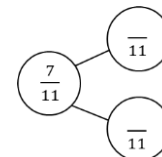
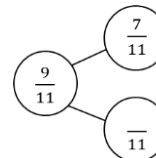
Use the models to help you subtract the fractions.

 $\frac{5}{7} - \frac{\square}{7} = \frac{\square}{7}$

 $\frac{4}{8} - \frac{\square}{8} = \frac{\square}{8}$

 $\frac{\square}{9} - \frac{\square}{9} = \frac{4}{9}$

Complete the part whole models. Use equipment if needed. Can you write fact families for each model?



Subtract Fractions

Reasoning and Problem Solving

Find the missing fractions:


$$\frac{7}{7} - \frac{3}{7} = \frac{2}{7} + \frac{\square}{7}$$

$$\frac{\square}{9} - \frac{5}{9} = \frac{4}{9} - \frac{2}{9}$$

$$\frac{7}{7} - \frac{3}{7} = \frac{2}{7} + \frac{2}{7}$$

$$\frac{7}{9} - \frac{5}{9} = \frac{4}{9} - \frac{2}{9}$$

Jack and Annie are solving $\frac{4}{5} - \frac{2}{5}$

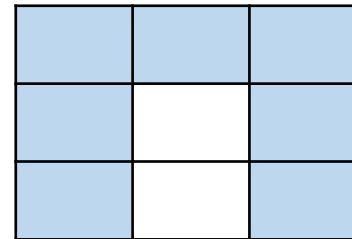
Jack's method: 

Annie's method: 

They both say the answer is two fifths.
Can you explain how they have found their answers?

Jack has taken two fifths away.
Annie has found the difference between four fifths and two fifths.

How many fraction addition and subtractions can you make from this model?



There are lots of calculations children could record. Children may even record calculations where there are more than 2 fractions e.g. $\frac{3}{9} + \frac{1}{9} + \frac{3}{9} = \frac{7}{9}$. Children may possibly see the red representing one fraction and the white another also.



Summer - Block 2

Time

Year 3

Overview

Small Steps

- Months and years
- Hours in a day
- Telling the time to 5 minutes
- Telling the time to the minute
- Using a.m. and p.m.
- 24-hour clock
- Finding the duration
- Comparing durations
- Start and end times
- Measuring time in seconds

NC Objectives

Tell and write the time from an analogue clock, including using Roman numerals from I to XII and 12-hour and 24-hour clocks.

Estimate and read time with increasing accuracy to the nearest minute.

Record and compare time in terms of seconds, minutes and hours.

Use vocabulary such as o'clock, a.m./p.m., morning, afternoon, noon and midnight.

Know the number of seconds in a minute and the number of days in each month, year and leap year.

Compare durations of events [for example to calculate the time taken by particular events or tasks].

Months and Years

Notes and Guidance

Children look at the concept of years and months. They are introduced to leap years and how they are different from a non-leap year.

Children should explore years using calendars to investigate the number of days in each month. Rhymes and songs are helpful for children to remember the number of days in each month.

Mathematical Talk

When is your birthday? What other significant dates are there during the year? Are they the same every year?

Which month comes before _____?
Which month comes after _____?

Which month changes when there is a leap year? Are there any other months that change length? Is this year a leap year? When will the next one be? When was the last one?

Varied Fluency

- Children should spend time exploring a real calendar. They sort the months into groups, by the number of days in each month, for both a year and a leap year. Children can use the groups to compare - what is the same and what is different?

- Use the numbers to fill in the gaps in the sentences.

There are _____ days in a year.

There are _____ months in a year.

There are _____ days in a leap year.

There are _____ days in a week.

Leap years happen every _____ years.

7

365

4

366

12

- Put these dates in order from earliest to latest in a year.

3rd March

2nd March

January 31st

1st December

Earliest
●
●
 Latest

Months and Years

Reasoning and Problem Solving

4 children describe their birthdays.



My birthday is the first day of the second month.

Mo

I was born on the 15th of June.



Teddy



I was born on the last day of the year!

Eva

I was born two days before Mo.



Dora

Can you work out their birthdays and order them from earliest to latest in the year?

Dora – 30th Jan
Mo – 1st Feb
Teddy – 15th June
Eva – 31st Dec

Whitney asks Rosie and Jack a question.

Some months have 31 days, some months have 30 days. How many months have 28 days?



Only February has 28 days.

Rosie

Every month has 28 days.



Jack

Who do you agree with? Explain your thinking.

They are correct for different reasons. Rosie is correct because only February has exactly 28 days, but Jack is correct because every month has at least 28 days.

Hours in a Day

Notes and Guidance

Children recap the number of hours in a day and are introduced to language such as ‘noon’, ‘midday’, ‘midnight’. They do not need to know the difference between a.m. or p.m. at this point.

Other facts such as days in a week/month are also reviewed. Attention should be drawn to the difference between a school week and a calendar week and between day-time and a day.

Mathematical Talk

What time does the day start? How many hours are there in a day?

How many hours do you spend at school in a day? When does school start and finish?

Why does a clock show 11 o'clock twice in a day?

Does the weekend and the school week split a whole week in half?

Varied Fluency

- Fill in the gaps in the sentence stems.
There are ____ days in a whole week.
There are ____ days in a school week.
There are ____ hours in a day.
There are ____ hours in a school day.

- Put the times/events into the correct place on the diagram.

| Morning | Afternoon | Evening | Night |
|-----------|-----------|----------|----------------|
| | | | |
| Breakfast | Midnight | Midday | Go to school |
| Supper | Bedtime | Assembly | Brushing teeth |

- Complete the statements.

| | |
|-----------------------|-----------------------|
| 1 day = 24 hours | ____ days = 120 hours |
| 2 days = ____ hours | ____ days = 60 hours |
| ____ days = 240 hours | 20 days = ____ hours |

Hours in a Day

Reasoning and Problem Solving



Mo

I get up at 7 o'clock in the morning and go to bed at 7 o'clock at night. This means I have been awake for a full day.

Do you agree with Mo?
Explain your answer.

Children should state that they do not agree with Mo because there are 24 hours in a full day. Mo has only been up for 12 hours which is half a day. A full day would be 7am to 7am.

| Su | Mo | Tu | We | Th | Fr | Sa |
|----|----|----|----|----|----|----|
| | 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 | | | |

In this month, there are no school holidays.

In this month we have to come to school for 31 days.



Teddy

Do you agree with Teddy?
Explain your thinking.
Which month could it be?

Teddy is not correct, as the children only have to come to school for 23 days if there are no holidays. Children should discuss the fact they do not come to school on a Saturday or Sunday. It is most likely to be March if there are no holidays at all. It is a good opportunity to look at your school calendar with the children.

Telling the Time (1)

Notes and Guidance

Children tell the time to the nearest 5 minutes on an analogue clock. They focus on the language of “past” and “to”, and will recognise and use Roman numerals on a clock face.

Attention should be drawn to the differences between the minute hand and the hour hand. This is especially important for times that are close to the next hour, for example, 5 minutes to 12

Mathematical Talk

Which of the hands is the minute hand and which is the hour hand?

Is the minute hand past or to the hour?

How many minutes past/to the hour is the minute hand?

If the minute hand is pointing at the 6, how many minutes have passed in this hour?

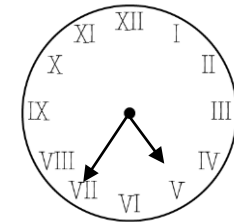
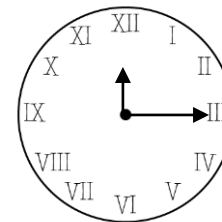
What do you notice about the clocks?

Which Roman numeral represents the number ____?

Do we ever say “45 minutes to” the hour?

Varied Fluency

- Give each child a clock with moveable hands.
Children represent different times to the nearest 5 minutes on their own clock.
Discuss whether the minute hand is past or to the hour in different times.

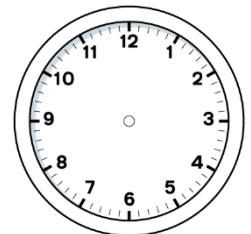


What time is shown on each clock?

_____ minutes past _____ _____ minutes to _____

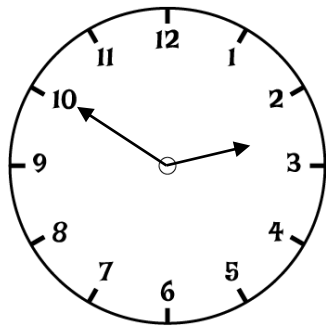
- Draw the hands on the clock to show the time:

25 minutes to 6



Telling the Time (1)

Reasoning and Problem Solving



Dora

The clock shows ten minutes to 3

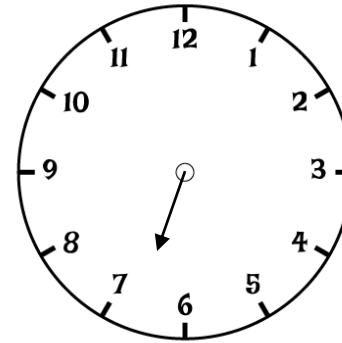
The hour hand is not quite pointing to the 3, so it must be ten to 2



Amir

Who do you agree with?
Explain your thinking.

Dora is correct because it is not 3 o'clock yet, the hour hand will not be exactly on the 3



This clock has lost its minute hand.

What time could it be?
Justify your answer.

The time is around half past six. Children may suggest it could be between twenty five to and quarter to seven.

Telling the Time (2)

Notes and Guidance

Children tell time to the nearest minute using an analogue clock. They use the terms 'past' and 'to'.

When telling time 'to' the next hour, children may need to count on to find how many minutes are left in the hour.

Mathematical Talk

Which hand is the minute hand? Which hand is the hour hand?

How many minutes is it past the hour?

How many minutes is it to the next hour?

When are the minutes to an hour and the minutes past an hour the same?

If the hour hand is between ____ and ____, which hour is the time referring to?

Varied Fluency

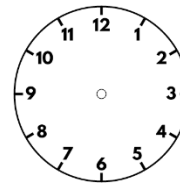
Show children various times to the nearest minute for them to read.

Give each child a clock with moveable hands.

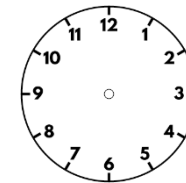
Children represent different times to the nearest minute on their own clock.

Discuss whether the minute hand is past or to the hour in different times.

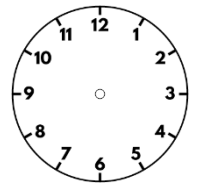
Draw the hands on the clock from the following times.



Four minutes to 4



24 minutes to 8



24 minutes past 8

Dora is telling the time from an analogue clock.



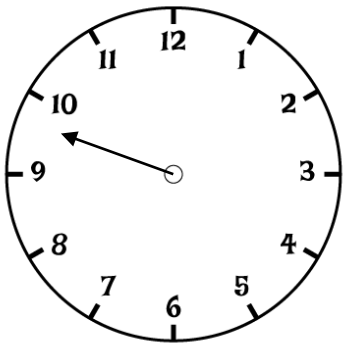
The hour hand is pointing to XI
the minute hand is pointing to XII

What time is it?

Telling the Time (2)

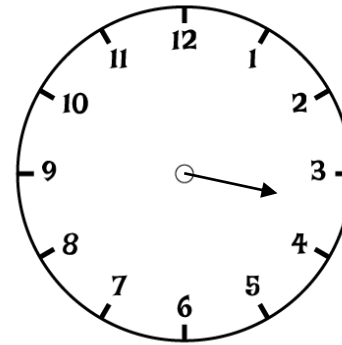
Reasoning and Problem Solving

This clock has lost its hour hand.
What time could it be?



The minute hand is at about 12 minutes to the hour. The time could be 12 minutes to any hour.

This clock has lost its minute hand.
What time could it be?



The hour hand is past the 3 and has not yet reached the 4. The hand is closer to the three and therefore the children should recognise that the time has not passed half past 3. You could accept any answers between quarter past to half past 3.

Using a.m. and p.m.

Notes and Guidance

Children use ‘morning’, ‘afternoon’, ‘a.m.’ and ‘p.m.’ to describe the time of day.

Children continue using analogue clocks and will be introduced to digital time for the first time.

Mathematical Talk

What time of the day does ____ happen?

Is ____ earlier or later than ____?

How do you know whether a time is in the morning or afternoon?

What times could be a.m.?

What times could be p.m.?

What is the difference between analogue and digital?

What would the time look like on an analogue clock?

How can we change analogue to digital?

Varied Fluency

- Using a visual timetable, sort the events into morning and afternoon.
Create sentences to describe when events take place.
For example: Maths is in the morning. Guided Reading is in the afternoon.

- Sort the times from latest to earliest.

5:30 p.m.

9:45 a.m.

9:45 p.m.

10:23 a.m.

7:31 a.m.

10:13 p.m.

8:30 a.m.

6:32 a.m.

12:24 a.m.

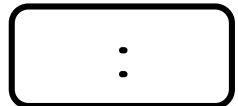
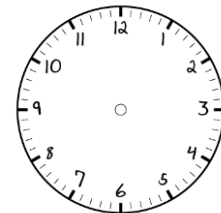
8:55 p.m.

2:11 a.m.

7:40 a.m.

- Show the times on both analogue and digital clocks.

- Guided reading at 10:00 a.m.
- Home time at 3:30 p.m.
- Lunchtime at 12:00 p.m.



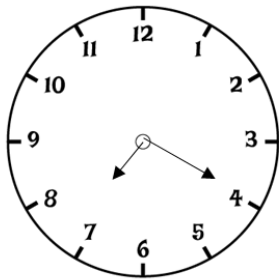
Using a.m. and p.m.

Reasoning and Problem Solving

The board shows the times of trains arriving and leaving the train station.

| | Arrives | Leaves |
|------------|-----------|-----------|
| London | 5:50 a.m. | 6:00 a.m. |
| Edinburgh | 8:00 a.m. | 8:20 a.m. |
| Manchester | 2:33 p.m. | 2:45 p.m. |
| Leeds | 7:31 p.m. | 7:35 p.m. |

Ron's watch shows the time he arrives at the station.



Which train could he be catching?
Explain how you know.

Ron could be catching the train to Edinburgh or Leeds. Children should explain that analogue clocks give no indication to a.m. or p.m. and since it is 20 past 7, Ron could be catching the 8:20 a.m. train or the 7:35 p.m. train.



Dora

I slept from 8 p.m. to 8 a.m.



Teddy

I slept from 8 a.m. to 8 p.m.

Who is more likely to be correct?
Explain how you know.

Dora is more likely to be correct, because if she sleeps 8 p.m. to 8 a.m., she would be sleeping through the night, and wake up in the morning. Teddy is likely to be incorrect, because he would be sleeping all day and waking up at 8 p.m. (in the evening)

24-hour Clock

Notes and Guidance

Children are introduced to telling the time on a 24-hour digital clock for the first time.

Children spend time looking at analogue and digital clocks at various times throughout the day, in order to compare what is the same and what is different.

Mathematical Talk

Using the 12-hour clock, is the time an a.m. or a p.m. time?


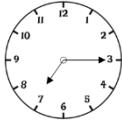

What will the number representing the hour be in 24-hour clock time? How do you know if it will be less than 12 or more than 12?

What will the minutes be in 24-hour time? Where can you count from? When does the number of minutes become 0 again on a 24-hour clock display?

Varied Fluency

- Create a diary using pictures to show your day from waking up to going to bed. Label these events using both 12-hour clock and 24-hour clock times.

- Match the times to the clocks showing the same time.

| | | |
|-------------------------------|--|---------|
| 9 o'clock in the morning |  | 19 : 15 |
| Half past 3 in the afternoon |  | 09 : 00 |
| Quarter past 7 in the evening |  | 15 : 30 |

- Complete the times.

| | | | |
|---------|---------------------------------|---------|-------------------------------------|
| 13 : 45 | Quarter to two in the _____ | __ : 45 | Quarter past three in the afternoon |
| 11 : 20 | Twenty past eleven in the _____ | 17 : __ | Twenty-five to six in the evening |
| 15 : 50 | Ten to four in the _____ | __ : __ | Twenty to 9 in the morning |

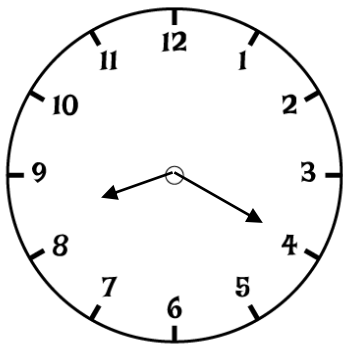
24-hour Clock

Reasoning and Problem Solving

Eva says the clocks are showing the same time of day.

Is she correct?
Explain how you know.

8:20



Eva could be correct. The clocks are both showing twenty past 8. However, children should recognise that the analogue clock does not show whether the time is a.m. or p.m., so this could be showing 8.20 a.m. or 8.20 p.m.

Is Teddy correct?
Prove it.



Teddy

If the time has an 8 in it, it has to be 8 o'clock.

Teddy is not correct. Children should give examples to show this is incorrect. For example: 18:00, 8:30, 10:38 etc.

Finding the Duration

Notes and Guidance

Children find the durations of events using both analogue and digital clocks. They should be given opportunities to practically work out durations of time using clocks with moveable hands. Number lines are also a useful model.

Children explore the most efficient ways of breaking the time down in order to work out the duration. For example: half hours, quarter of an hour and five minutes.

Mathematical Talk

When did ____ start, and when did it finish?

How many hours/minutes is a full turn of the minute hand around the clock?

Do we need to count each individual minute?

How else could you break down the duration to make it easier to count?

Varied Fluency

Calculate the duration of the TV programmes.

| TV Programme | Start Time | Finish Time | Duration |
|---------------------|------------|-------------|----------|
| Pals | 06:30 | 07:30 | |
| Dennis the explorer | 15:15 | 18:15 | |
| The football show | 12:00 | 14:00 | |
| An adventure | 10:40 | 12:40 | |

Use an individual clock to work out the time spent running then complete the sentences.

Rosie started running at 7:20 a.m. and stopped at 8:45 a.m.

Rosie ran for ____ minutes.

Tommy started running at 09:10 and stopped at 09:55

Tommy ran for ____ minutes.

Amir gets on a bus at 15:23

It arrives at 16:22

How long was the bus journey?

How many ways can you find to work out the answer?



Finding the Duration

Reasoning and Problem Solving

Eva starts playing her piano at 11:30



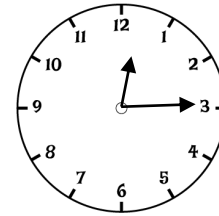
She plays for 45 minutes before having a half an hour break.

She then plays for another 15 minutes.

What time did she finish?

Eva finishes at 13:00 or 1 o'clock

Lunchtime begins at:



Lunchtime ends at:



Teddy and Rosie are working out how long lunchtime lasts for.



Teddy

I did three quarters of an hour then added 10

I did 1 hour take away 5 minutes



Rosie

Whose method is correct?

Both children's methods are correct.

Teddy has found the duration by $15 + 15 + 15 + 10 = 55$ minutes.

Rosie has found the duration by noticing that one hour after the start of lunch it will be 1:15, so she needs to take 5 minutes from 1 hour to also give 55 minutes.

Comparing the Duration

Notes and Guidance

Children compare durations of time using analogue and digital clocks. They could use empty number lines to model the situations as these will assist with bridging over hours.

They use their knowledge of addition and subtraction, and that there are 60 minutes in an hour, to compare the length of time taken by particular events or tasks.

Mathematical Talk

Which is the longest amount of time?

Which is the shortest amount of time?

Is _____ longer or shorter than _____?

How much longer was _____?

How much shorter was _____?

Varied Fluency

- Use your class daily timetable to answer these questions.
Which is the longest lesson?
Which is the shortest lesson?
How much longer is _____ than _____?

- Use the symbols $<$, $>$ and $=$ to compare the following durations.

2:00 p.m. – 6:00 p.m.



08:00 a.m. – 12:00 p.m.

07:30 a.m. – 09:30 a.m.



11:40 a.m. – 02:40 p.m.

03:30 a.m. – 05:00 p.m.



03:30 p.m. – 05:00 a.m.

- Complete the sentence about the duration of the train journeys.

| Destination | Train departs | Train arrives |
|-------------|---------------|---------------|
| London | 08:45 | 11:35 |
| Leeds | 10:05 | 10:33 |
| Manchester | 13:10 | 14:20 |

The journey to London is _____ than the journey to Manchester.

Which journey takes the least amount of time?

Comparing the Duration

Reasoning and Problem Solving

Eva and Mo are having a race.
It takes Eva 3 and a half minutes to complete the race.
It takes Mo 3 minutes and 15 seconds.



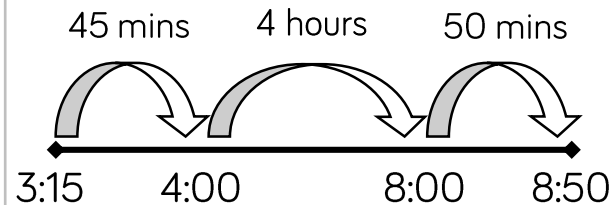
I won because I got a higher time.

Is Eva correct?
Explain how you know.

Eva is incorrect.
Eva took longer to finish the race therefore she finished after Mo.
The winner of a race is the person who finishes in the shortest amount of time.

Jack's school starts at ten to 9 and finishes at quarter past 3

He uses the number line to calculate how long the school day is.



Jack works out the school day is 5 hours and 35 minutes long.
Jack is incorrect.

Explain his mistake.

Jack has worked out the time from 3:15 p.m. until ten to 9 in the evening. He should start at 8:50 a.m. and work through noon to 3:15 p.m.

Start and End Times

Notes and Guidance

Children find start and end times to the nearest minute using both analogue and digital times.

They could use real clocks with moveable hands whilst learning how to add and subtract times, and then move to number lines to help calculate start and end times.

Part-whole models could also be used to split longer intervals.

Mathematical Talk

Which hand do you need to move?

Do you need to move the hand clockwise or anti-clockwise?

What time should the number line start at?

Will you jump forwards or backwards?

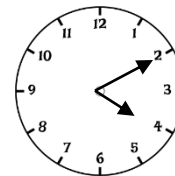
How many intervals will you break the duration into?

Would a part-whole model help?

Varied Fluency

Practice finding start/end times by moving hands on a clock. For example, If playtime starts at five past ten and lasts for 20 minutes, what time will playtime end?

A fifty minute maths lesson finishes at 10.15. What time does the lesson start?

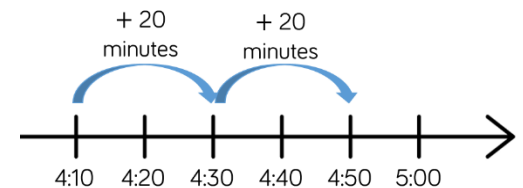


A 40 minute TV programme starts at the time shown. What time does it finish?

We can use a number line to work out the end time.

Use this method to work out:

- The end time of a 25 minute lesson starting at 2.15 p.m.
- The start time if a 1 hour 10 minute journey ended at 4 o'clock.



Which activity ends the latest?

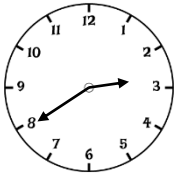


Gymnastics starts at 15:30 and lasts 1 hour 15 minutes.

Football starts at 16:05 and lasts 45 minutes.

Start and End Times

Reasoning and Problem Solving



School ends in 45 minutes.
What time will it be?

Amir says,



It's 20 minutes to 3
o'clock, so school
finishes at 3:25 p.m.

Whitney says,



School ends at 2:85

Who do you agree with?
Explain why.

I agree with Amir,
because Whitney
has not
remembered that
there are 60
minutes in an hour
and has added 45
minutes to 2:40
Children may use
a number line to
prove Amir is
correct.

Tommy is halfway through watching his
favourite TV programme. He looks at his
watch and it shows this time.

15:45

The show is less than 1 hour long.

What could the start and end time be?

How many different start and end times
can you find?

Possible answers
include:

Start at 15.20 and
end at 16.10
Start at 15.25 and
end at 16.05
Start at 15.30 and
end at 16.00
Start at 15.35 and
end at 15.55
Start at 15.40 and
end at 15.50

Measuring Time in Seconds

Notes and Guidance

Children measure and compare durations of time in seconds. It is important for children to have a realistic sense of what time in seconds feels like, as they often count in seconds too quickly. They could use a stopwatch to compare, for example, counting to 10 seconds in their heads with the actual timed duration. They recognise that there are 60 seconds in one minute and use this to write durations of time in different ways e.g. 80 seconds is the same as 1 minute and 20 seconds.

Mathematical Talk

What can we use to measure time in seconds accurately?

Can you suggest a task that lasts ____ seconds?

Which task took the longest/shortest time to complete?

How many seconds are there in 1 minute?

If a task takes longer than 60 seconds, how else could we record the duration of time?

How could we work out how many seconds there are in ____ minutes?

Varied Fluency

- Children use a stopwatch to find the length of time it takes, in seconds, to complete different tasks. For example, run across the hall/playground, do 10 star jumps, write their name. How long did each task take?

Order the tasks based on the time they took to complete.

- Match the times in words to the times shown on the stopwatches.

Two minutes five seconds

00:01:50

10 seconds less than 2 minutes

00:02:30

Two minutes 50 seconds

00:02:05

150 seconds

00:02:50

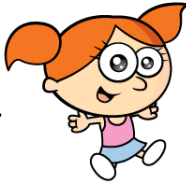
- Complete the table.

| Time in minutes | Time in seconds |
|----------------------|-----------------|
| 2 minutes | |
| | 100 seconds |
| 3 minutes 20 seconds | |

Measuring Time in Seconds

Reasoning and Problem Solving

Alex takes 153 seconds to skip around the playground.



Jack takes 2 minutes 23 seconds.

Who is the quickest?
Explain how you know.

Jack is quickest.
If we convert 2 minutes 23 seconds into seconds it is $120 + 23 = 143$ seconds.
So Jack was 10 seconds quicker than Alex.

True or False?

- 3 minutes 5 seconds $<$ 190 seconds
- 4 minutes = 204 seconds
- 170 seconds $>$ 2 minutes 50 seconds

- TRUE
 - FALSE
- 4 minutes is equal to 240 seconds
- FALSE
- 170 seconds is equal to 2 minutes 50 seconds

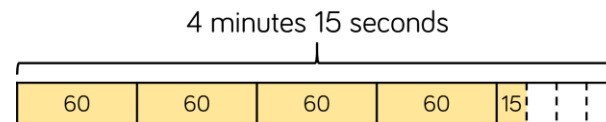
Dora works out how many seconds there are in 4 minutes 15 seconds.

She says,



That's easy, it is 415 seconds.

Dexter uses a bar model to help him.



Each minute has 60 seconds. So it's 4 lots of 60 plus 15.

Who is correct?

Dora thinks there are 100 seconds in 1 minute, but there are 60.
Dexter is correct
 $60 \times 4 = 240$
 $240 + 15 = 255$ seconds.

White
Rose
Maths

Summer - Block 3

Properties of Shape

Year 3

Overview

Small Steps

NC Objectives

- Turns and angles
- Right angles in shapes
- Compare angles
- Draw accurately
- Horizontal and vertical
- Parallel and perpendicular
- Recognise and describe 2D shapes
- Recognise and describe 3-D shapes
- Make 3-D shapes

Recognise angles as a property of shape or a description of a turn.

Identify right angles, recognise that two right angles make a half-turn, three make three quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle.

Identify horizontal and vertical lines and pairs of perpendicular and parallel lines.

Draw 2-D shapes and make 3-D shapes using modelling materials.

Recognise 3-D shapes in different orientations and describe them.

Turns and Angles

Notes and Guidance

Children recognise angles as a measure of a turn. They practice making $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$ and whole turns from different starting points in both clockwise and anti-clockwise directions in practical contexts. They should listen to/follow instructions and also give instructions using the correct mathematical language in different contexts. Children understand that an angle is created when 2 straight lines meet at a point.

Mathematical Talk

If we start by facing _____ and make a _____ turn, what direction will we be facing?

If we face _____ and turn to face _____, what turn have we made?

If we face north and make a quarter turn clockwise, which direction will we be facing? What if we turn anti-clockwise? What would the time be if the minute hand started at 1, then made a quarter of a turn?

Can you see any angles around the classroom?

Varied Fluency

- Take children outside or into the hall where they can practice moving in turns themselves. Label 4 walls/points (for example: North, South, East, West).

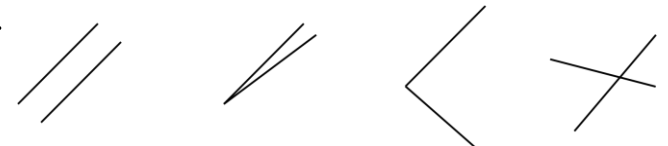
Give children instructions to encourage them to make $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$ and whole turns from different starting points. Allow children the opportunity to give instructions too.

- Look at the hands of the clock.
Turn the minute hand one quarter of a turn clockwise.
Where is the large hand pointing?
What is the new time?



What turn has the minute hand made?

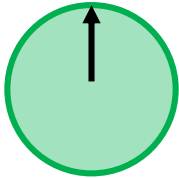
- Tick the images where you can see an angle.
Explain your choices.



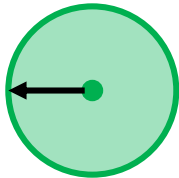
Turns and Angles

Reasoning and Problem Solving

The arrow on a spinner started in this position.



After making a turn it ended in this position.



Jack says,



The arrow has moved
a quarter turn
anti-clockwise.

Alex says,



The arrow has moved
a three-quarter turn
clockwise.

Who do you agree with?

Both children are
correct.

The letter 'X' has four angles.



Write your name in capital letters.

How many angles can you see in each
letter?

How many angles are there in your full
name?

Answers will vary
depending on the
children's names.

Right Angles in Shapes

Notes and Guidance

Children recognise that a right angle is a quarter turn, 2 right angles make a half-turn, 3 right angles make three-quarters of a turn and 4 right angles make a complete turn.

Children need to see examples in different orientations so that they understand that a right angle does not have to be made up of a horizontal and vertical line.

Mathematical Talk

How many right angles make a half turn/three-quarter turn/full turn?

Where can you see a right angle in the classroom/ around school/ outside?

Which shapes contain right angles?

Can you think of a shape which doesn't have any right angles?

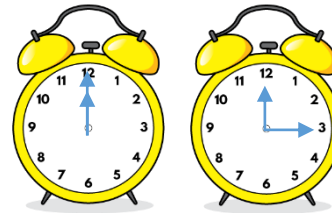
How many right angles does a _____ have?

Can you draw a shape with _____ right angles?

What headings would we place in our table?

Varied Fluency

- Give children a clock each so they can practice making turns. Start with the hands showing 12 o'clock, move the minute hand one quarter of a turn.



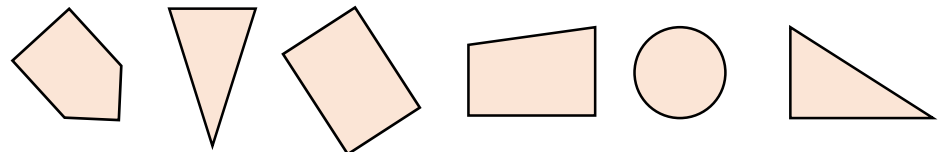
The angle between the hands is called a _____ angle.
One quarter turn is equal to a _____ angle.

- Children can create a 'Right Angle Tester' E.g.



They can then go on a right angle hunt around school. Find and draw at least 3 right angles you have seen around your school.

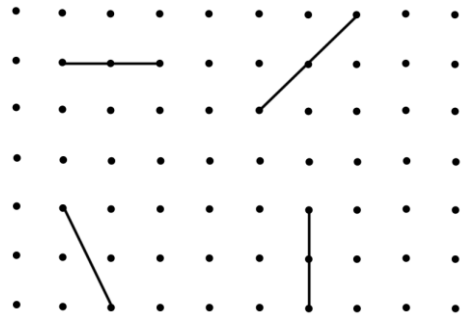
- Sort the shapes based on the number of right angles they have. Record your answer in a table.



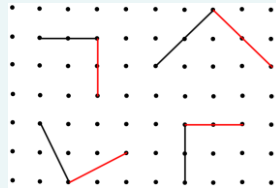
Right Angles in Shapes

Reasoning and Problem Solving

Draw a line along the dots to make a right-angle with each of these lines:

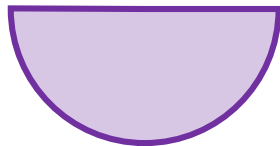


For example (see red lines):



True or False?

This shape has two right-angles.

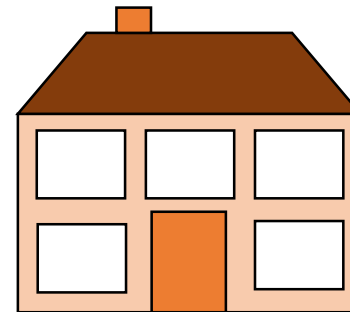


Explain your answer.

False.

Children could show this by using the corner of a page to show there aren't any right angles.

How many right angles can you see in this image?



Can you create your own image with the same number of right angles?

There are 34 right angles.

Compare Angles

Notes and Guidance

Children identify whether an angle is greater than or less than a right angle in shapes and turns, by measuring, comparing and reasoning in practical contexts.

Children are introduced to the words 'acute' and 'obtuse' as a way of describing angles.

Mathematical Talk

What is an acute? (Give 3 examples of acute angles and ask them to identify what's the same about them. Draw out that they are all smaller than a right-angle).

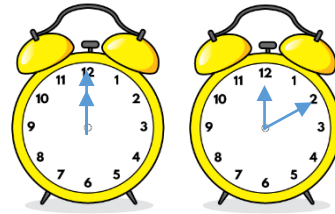
What's an obtuse angle? (Repeat activity by giving 3 examples of obtuse angles).

Can you give me a time where the hands on the clock make an acute/obtuse angle?

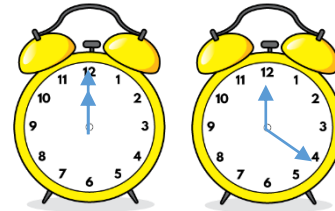
Can you see an acute/obtuse angle around the classroom?

Can you draw me a shape that contains acute/obtuse angles?

Varied Fluency



The angle between the hands is _____ than a right angle.
This is called an _____ angle.



The angle between the hands is _____ than a right angle.
This is called an _____ angle.

Explore other times where the hands make an acute/obtuse angle.



Find 3 acute angles and 3 obtuse angles in your classroom.
Use your 'Right Angle Tester' to check.



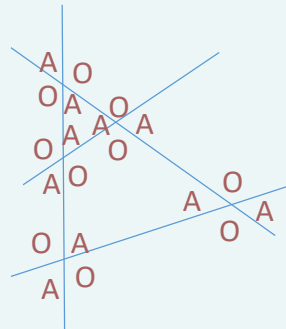
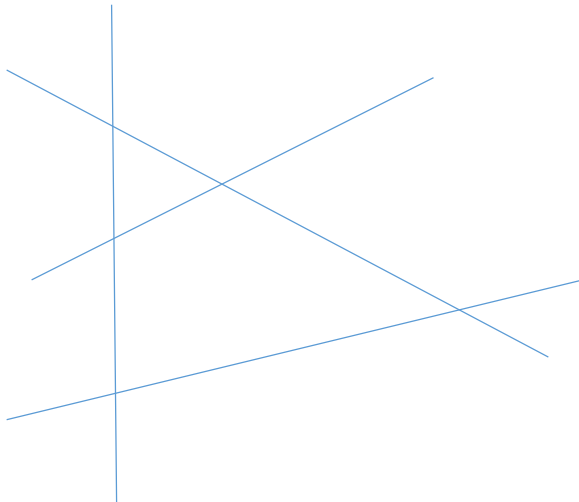
Label any acute or obtuse angles in these images.



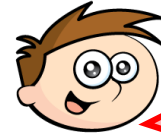
Compare Angles

Reasoning and Problem Solving

Label the acute angles (A) and obtuse angles (O) on the diagram below



Teddy describes a shape.

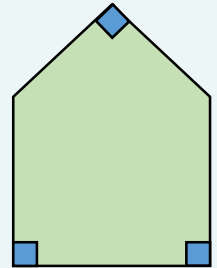


My shape has 3 right angles and 2 obtuse angles.

What could Jack's shape look like?

Describe a shape in terms of its angles for a friend to draw.

Possible answer:



Draw Accurately

Notes and Guidance

Children measure and draw straight lines accurately in centimetres and millimetres. They also practice rounding measurements to the nearest centimetre.

Make sure the children correctly position the ruler when measuring/drawing the line, by lining up the 0 with the start of the line.

Mathematical Talk

Where should we position the ruler when measuring each line?
Why?

How long is each line in millimetres?

Why does 9 cm and 9 mm round to 10 cm and not 9 cm?
Look at the ruler/number line to explain your answer.

Do we round 10 cm and 5 mm to 10 cm or 11 cm? Why?

Varied Fluency

Measure these lines. Record your measurements in cm and mm.
_____ cm and _____ mm



_____ cm and _____ mm



_____ cm and _____ mm



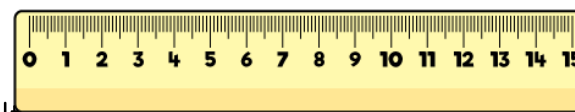
Draw straight lines that measure exactly:

12 cm

8 cm and 5 mm

9 cm and 8 mm

14 cm and 2 mm



This line measures
9 cm and 9 mm

It measures _____ cm to the nearest centimetre.

Draw a line for each of the measurements.

5 cm and 2 mm

13 cm and 8 mm

0 cm and 9 mm

10 cm and 3 mm

What would each line measure to the nearest centimetre?

Reasoning and Problem Solving

Horizontal & Vertical

Notes and Guidance

Children identify and find horizontal and vertical lines in a range of contexts.

They identify horizontal and vertical lines of symmetry in shapes and symbols.

Mathematical Talk

What can you use to help you remember what a horizontal line looks like? (The horizon)

Can you see horizontal and vertical lines around the classroom?

What do we call a line that is not horizontal or vertical?

Which shapes/symbols/letters have a horizontal/vertical line of symmetry?

Which have both?

Can you draw your own shape that has a horizontal and vertical line of symmetry?

Varied Fluency



A line that runs from left to right across the page is called a _____ line.

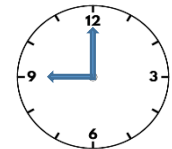
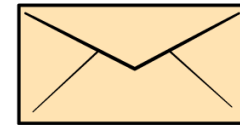
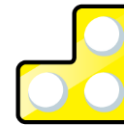


A line that runs straight up and down the page is called a _____ line.

Find 3 horizontal and 3 vertical lines in the classroom.



Label the horizontal and vertical lines in each of these images.






Sort the shapes/symbols/letters depending on whether they have a horizontal line of symmetry, a vertical line of symmetry or both.



Horizontal & Vertical

Reasoning and Problem Solving

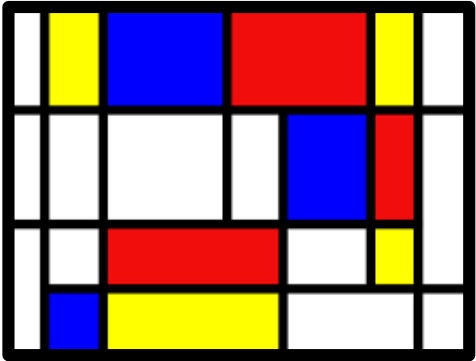
| Horizontal line of symmetry | Vertical line of symmetry | Horizontal and vertical lines of symmetry |
|--|---|---|
|  |  |  |

Eva thinks the star has both lines of symmetry, but it only has a vertical line of symmetry.



Eva completes the table by drawing shapes.

Can you spot and correct her mistake?



There are 5 horizontal lines and 8 vertical lines.

How many horizontal and vertical lines can you spot in this image by Mondrian?

Create your own piece of art work using only horizontal and vertical lines.

Parallel & Perpendicular

Notes and Guidance

Children identify and find parallel and perpendicular lines in a range of practical contexts.

They use the arrow notation to represent parallel lines and the right angle notation for perpendicular lines.

Ensure that children are presented with lines that are not horizontal and vertical.

Children may need to use their right-angle tester to help them check that lines are perpendicular.

Mathematical Talk

Where might you see sets of parallel lines in the environment?

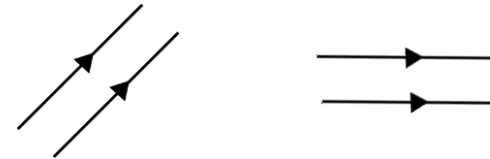
Can you see sets of parallel and perpendicular lines around the classroom?

Which shapes have only parallel lines?

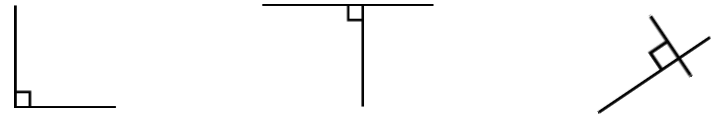
Which shapes have perpendicular lines?

Which shapes have both parallel and perpendicular lines?

Varied Fluency



Lines that never meet are called _____ lines.



Straight lines that meet at a right angle are called _____ lines.



Find 3 sets of parallel and perpendicular lines in the classroom.

Draw a line that is parallel to this one.

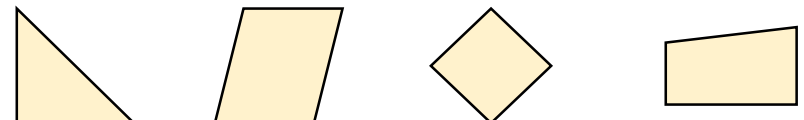


Draw a line that is perpendicular to this one.



Use arrows to show the parallel lines in these shapes.

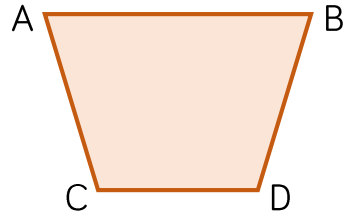
Use the right angle notation to show the perpendicular lines.



Parallel & Perpendicular

Reasoning and Problem Solving

True or False?



Line AB is parallel to line CD.
Line AC is parallel to line BD.
Line AC is perpendicular to line CD.

Redraw the shape so that line BD is perpendicular to line CD.

These lines are NOT parallel.



Convince me.

True
False
False



Children can draw and continue the lines to show that they will eventually meet so are not parallel.

Mark 3 sets of parallel lines and 3 sets of perpendicular lines in this flag.



Design your own flag containing parallel and perpendicular lines.

For example.



2-D Shapes

Notes and Guidance

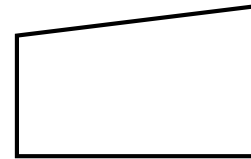
Children recognise, describe and draw 2-D shapes accurately. They use properties including types of angles, lines, symmetry and lengths of sides to describe the shape. They could be given opportunities to identify/draw a hidden shape from a description given and also describe a shape for a friend to identify/draw.

Mathematical Talk

How many angles does a _____ have?
 What types of angles does a _____ have?
 How many lines of symmetry does a _____ have?
 What kind of lines of symmetry does a _____ have?
 (vertical/horizontal)
 What types of lines can you spot in a _____?
 (perpendicular/parallel)
 Can you guess the shape from the description given?
 Can you draw a shape from the description given?

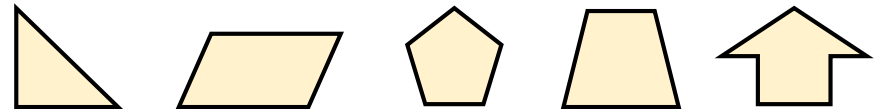
Varied Fluency

Describe this quadrilateral.



It has ____ angles.
 It has ____ right angles.
 It has ____ obtuse angle.
 It has ____ acute angle.
 It has ____ lines of symmetry.

Choose one of these 2-D shapes and describe it to a friend thinking about the angles, types of lines it is made up of and whether it has any lines of symmetry. Can your friend identify the shape from your description?



Draw the following shapes.

- A square with sides measuring 2 cm
- A square that is larger the one you have just drawn
- A rectangle with sides measuring 4 cm and 6 cm
- A triangle with two sides of equal length

2-D Shapes

Reasoning and Problem Solving

Rosie describes a 2-D shape.



My shape has 2 pairs of parallel sides. The lengths of the sides are not all equal.

Draw the shape that Rosie is describing.

Could this square be Rosie's shape?



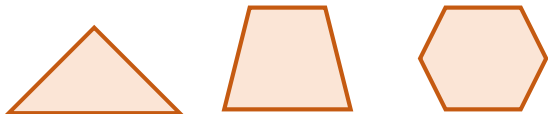
Explain why.

Children could draw:



No this can't be Rosie's shape, because the lengths of the sides are equal.

What is the same and what is different about these shapes?



Possible answers:
All have at least 1 line of symmetry. They have different number of sides/angles. Only the triangle has a pair of perpendicular sides.

Draw at least one shape in each section of the diagram.

| | At least one right angle | No right angles |
|-------------|--------------------------|-----------------|
| 4 sided | | |
| Not 4 sided | | |

Many possible answers.

3-D Shapes

Notes and Guidance

Children recognise and describe 3-D shapes in different orientations. They use properties including the number of faces, edges and vertices to describe the shape. Where a shape has a curved surface, children should know that this is not called a face. e.g. a cylinder has 2 circular faces and a curved surface. Teachers should explore the difference between a prism, which has the same shape all the way through, and a pyramid, which tapers to a point.

Mathematical Talk

How many faces/edges/vertices/curved surfaces does a _____ have?

What shape are the faces of a _____?

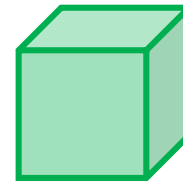
What types of lines can you see on a _____?

Can you spot objects around the classroom that are cubes/cuboids etc.?

Can you guess the shape from the description given?

Varied Fluency

Describe this 3-D shape.



This shape is a _____.

It has _____ faces.

It has _____ edges.

It has _____ vertices.

Choose one of these 3-D shapes and describe it to a friend thinking about the number and shape of faces it has and the number of edges and vertices. Can your friend identify the shape from your description?



What is the same and what is different about these two shapes?



Choose two other shapes and say what is the same and what is different about them.

3-D Shapes

Reasoning and Problem Solving

Mo has a 3-D shape, he says,



One face of my 3-D shape is a square.

Possible answers:
Cube
Cuboid
Square based pyramid

What could Mo's shape be?

Alex says,



All 3-D shapes are prisms.

I do not agree with Alex e.g. cones, pyramids, spheres are not prisms.

Do you agree with Alex?
Explain why.

Sort a selection of 3-D shapes using the criteria in the table.

| | At least one triangular face | No triangular faces |
|-------------|------------------------------|---------------------|
| Prism | | |
| Not a prism | | |

Change the headings of the table and re-sort your shapes.

Various possibilities depending on the shapes used.

Construct 3-D Shapes

Notes and Guidance

Children make 3-D shapes (cubes, cuboids, prisms, cylinders, pyramids, cones, spheres) using construction materials.

They use correct mathematical language to describe the shapes they have made (edges, faces, vertices, curved surfaces).

Mathematical Talk

Can you describe your shape using edges, faces, vertices, curved surfaces?

What is the same and what is different about your shape compared to your partner's?

What do the straws represent?

What does the Play-Doh represent?

How many straws/balls of Play-Doh do you need to create a _____?

Why can't you create a sphere or cylinder using this technique?

Varied Fluency

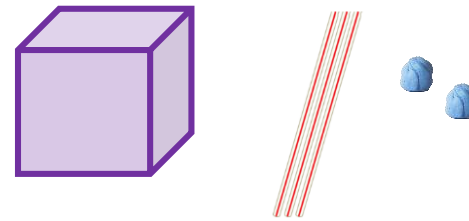
Children make a 3-D shape using Play-Doh/clay/plasticine/polydron.

Ask them to make a different one to their partner.

Write down the similarities and differences between them.

Discuss what the properties of each shape are.

Use straws and Play-Doh to create a model of a cube.



What other 3-D shapes can you create?

Cut and fold these into 3-D shapes.

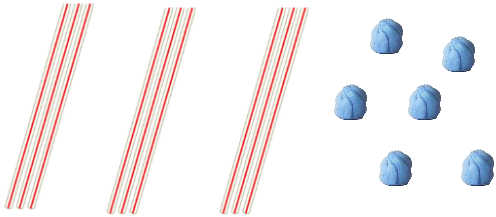


What shapes have you created?

Construct 3-D Shapes

Reasoning and Problem Solving

I have 9 straws and 6 balls of Play-Doh.



What 3-D shape can I create using all of the straws and Play-Doh? Have a go at making it.



True or false?

- You can cut out lots of equal squares and make a 3-D shape from them.
- You can cut out some circles and rectangles and make a 3-D shape from them.

True – for example a cube.

True – a cylinder.

Rosie says,



I can create a model of a square-based pyramid using 3 straws and 3 balls of Play-Doh.

Explain the mistake Rosie has made.

How many straws and balls of Play-Doh would you need to create a pyramid?

Rosie thinks that because a pyramid has some triangular faces she will only need 3 straws/balls of Play-Doh.

You would need 8 straws and 5 balls of Play-Doh to make a square-based pyramid, and 6 straws and 4 balls of Play-Doh to make a triangle based pyramid.

White
Rose
Maths

Summer - Block 4

Mass & Capacity

Year 3

Overview

Small Steps

NC Objectives

- Measure mass (1)
- Measure mass (2)
- Compare mass
- Add and subtract mass
- Measure capacity (1)
- Measure capacity (2)
- Compare capacity
- Add and subtract capacity

Measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)

Measure Mass (1)

Notes and Guidance

Children learn how to read a range of scales to measure mass, including scales with missing intervals. In this step, children read scales in either kilograms or grams.

Use kilogram and gram weights to reinforce the difference in the units. Represent the intervals on the scale on a straight number line to highlight the link back to place value.

Mathematical Talk

How can we measure the mass of an object?

When would we use kilograms or grams to measure the mass of something?

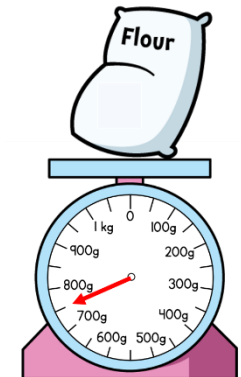
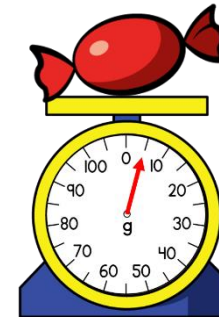
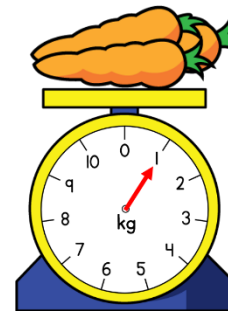
What's the same, what's different about the scales?

How do we know what each interval is worth?

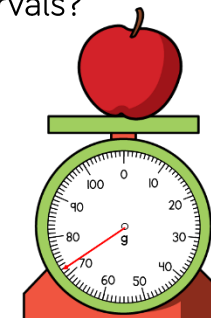
Varied Fluency

- Use balance scales to measure the mass of a range of objects. Decide whether to use gram or kilogram weights to balance the scales. Can you estimate the mass of each object before you weigh them?

- Find the mass of each item.

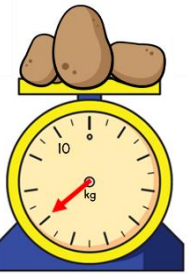



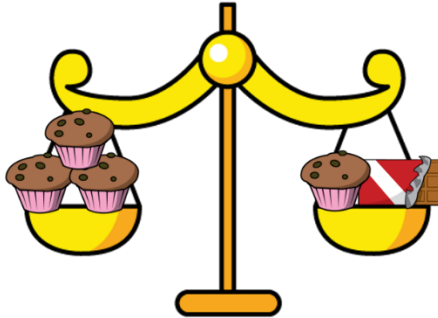


- Draw each scale as a straight number line. Can you identify the missing intervals?



Measure Mass (1)

Reasoning and Problem Solving

| | | | |
|---|---|--|--|
| <div></div> <p>Who do you agree with? Explain why.</p> <div><p>The potatoes weigh 13 kg</p><p>Amir</p></div> <div><p>We don't know how much the potatoes weigh because the number is hidden.</p><p>Jack</p></div> <div><p>The potatoes weigh more than half of 10 kg</p><p>Rosie</p></div> <p>Can you calculate the weight of the potatoes? Explain how you did it.</p> | <p>Amir is wrong – he has counted on 3 from 10 kg when he should have counted back 3 kg.</p> <p>Jack is wrong because we can work out the scale by using the 10 kg and counting back. They weigh 7 kg.</p> <p>Rosie is correct because half of 10 is 5 and the arrow is past where 5 kg would be.</p> <p>The weight of the potatoes is 7 kg</p> | <p>The chocolate bar weighs 100 g. How much does one muffin weigh?</p> <div></div> <p>How much does each side weigh?</p> <p>Using only 3 objects and a weighing scale, try to get as close to 2 kg as possible. Explain why you chose those objects. Work out how much more or how much less is needed to make it 2 kg.</p> | <p>Children could use a bar model to work this out. They would see the chocolate bar must weigh the same as two muffins so one muffin must weigh 50 g. Each side weighs 150 g.</p> |
|---|---|--|--|

Measure Mass (2)

Notes and Guidance

Children measure the mass of objects and record them as a mixed measurement in kilograms and grams. When given a mixed measurement, children can record the mass on scales by calculating the intervals and identifying where the arrow will go.

Recap counting in different multiples to support children's reading of scales with different intervals.

Mathematical Talk

Which is heavier, 7 kilograms or 8 grams?

How is a scale like a number line?

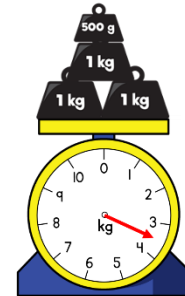
Does drawing a number line help you to find the intervals?

Where do we use measuring mass on a daily basis?

Varied Fluency

What weight is on the scales?

How do the scales show this?

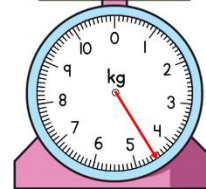


Complete the missing information.

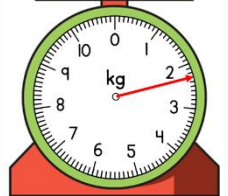


The toy car weighs 4 kg and ____ g

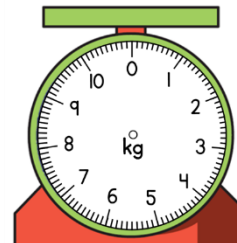
The potatoes weigh 2 kg and ____ g



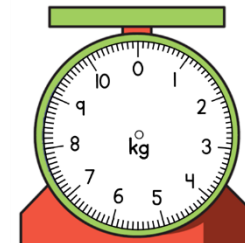
Use your own scales to measure how much objects weigh and record the mass in kg and g.



Draw an arrow on the scales to show the mass of each object.



= 1 kg and 700 g

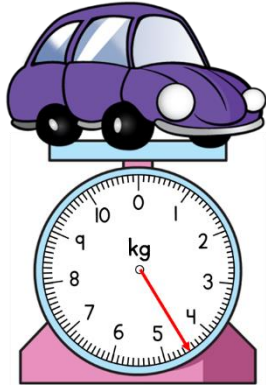


= 2 kg and 100 g

Measure Mass (2)

Reasoning and Problem Solving

Tommy is weighing
a toy car.



Use this to work out
what the other
children's cars weigh.



Alex

My car weighs 1 kg more
than Mo's.



Mo

My car weighs 200 g less
than Tommy's.



Dexter

My car weighs 1 kg and
300 g less than Alex's.

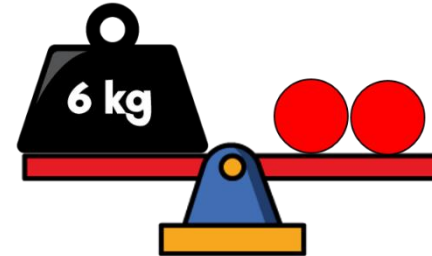
Tommy's car
weighs 4 kg and
500 g.

Alex's car weighs 5
kg and 300 g.

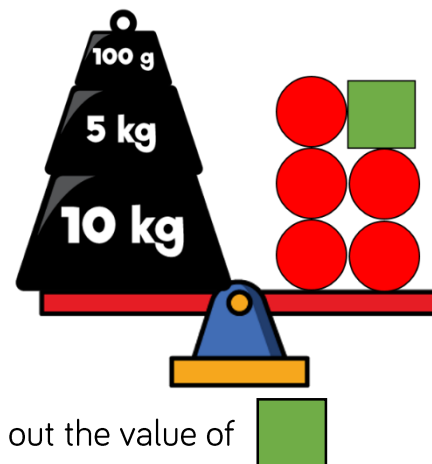
Mo's car weighs 4
kg and 300 g.

Dexter's car
weighs 4 kg.

Here is a balance.



Here is another.



Work out the value of



Can you create your own version for a
partner?

One circle weighs
3 kg.
The square weighs
100 g.

Compare Mass

Notes and Guidance

Children build on Year 2 knowledge and use 'lighter' and 'heavier' to compare mass. They use their understanding that kilograms are used for heavier objects and will use this to help them compare mass. For example 500 g is less than 500 kg. Children compare mixed measurements using the inequality symbols. For example, 1 kg and 500 g < 2 kg.

Mathematical Talk

Which item is heavier or lighter? How do you know?

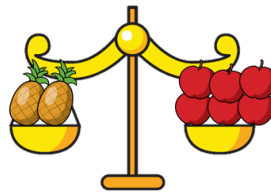
Using the symbols <, > or =, what can you tell me about each of the scales?

If I added an extra item, what would happen?

Can I work out how much one item weighs? Would this be more or less than the other item?

Varied Fluency

Complete the sentences.

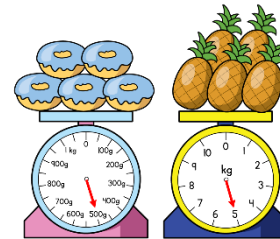


pineapples are equal to apples.

1 pineapple is equal to apples.

Can you write sentences using 'heavier' or 'lighter' about the image?

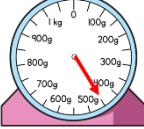
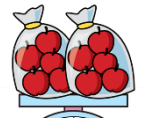
Use <, > or = to compare the mass of each pair of objects.



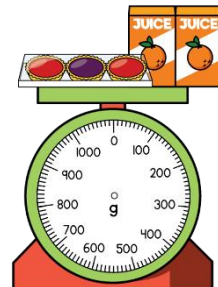
500 g 5 kg



1,000 g 1 kg

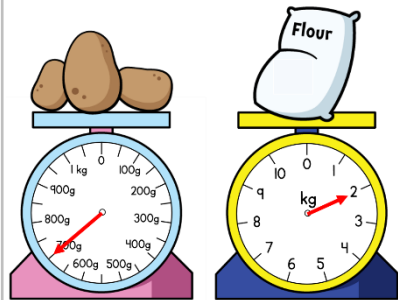


A pack of tarts weighs 220 g.
Two cartons of orange juice weigh 140 g.
Draw an arrow to show the weight of the 3 items.



Compare Mass

Reasoning and Problem Solving



Three children are weighing potatoes and flour.



Whitney

The potatoes weigh more because the arrow is further than the arrow on the flour scale.

The flour weighs less because 2 is less than 700



Amir



Alex

The flour weighs more because 2 kg is more than 700 g.

Who do you agree with?
Explain your answer.

Whitney is wrong because the scales are different.
Mo is wrong because he hasn't noticed the flour is weighed in kg and the potatoes are weighed in g.
Alex is correct because 2 kg is the same as 2,000 g which is more than 700 g.

Here are three masses.

20 kg and 600 g

20 kg

18 kg and 500 g

Match each mass to the correct child.

Dora



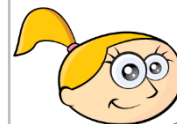
My mass weighs more than $\frac{1}{2}$ of 40 kg.

My mass is more than Eva's mass.

Mo



Eva



My mass weighs more than 18 kg but less than 20 kg.

Eva: 18 kg and 500 g

Mo: 20 kg

Dora: 20 kg and 600 g

Add & Subtract Mass

Notes and Guidance

Children add and subtract mass. They use a range of mental and written methods, choosing the most efficient one for each question.

Children may use concrete resources to represent kilograms and grams. Children could also use bar models to support them to represent calculations.

Mathematical Talk

How many grams are in a kilogram? How could I represent this using concrete resources?

What do you know about kilograms or grams that can help you solve this question?

How can you represent this problem with a bar model?

Varied Fluency

Amir uses a part-whole model to add 2 kg and 300 g to 3 kg and 250 g. He partitions each mass into kilograms and grams and calculates them separately.

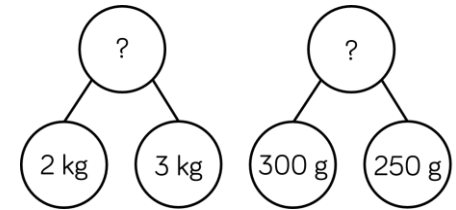
Use Amir's method to calculate:

3 kg and 450 g + 4 kg and 200 g

4 kg and 105 g + 2 kg and 300 g

4 kg and 400 g – 2 kg and 100 g

8 kg and 600 g – 1 kg and 550 g



The jar of cookies has a mass of 800 g.

The empty jar has a mass of 350 g.

How much do the cookies weigh?



Choose an appropriate approach to solve:

- $7 \text{ kg} - \square = 5 \frac{1}{2} \text{ kg}$
- $3 \text{ kg and } 200 \text{ g} + \square = 4 \frac{1}{2} \text{ kg}$
- $4 \text{ kg} + \square - 1 \frac{1}{2} \text{ kg} = 3 \text{ kg}$

Add & Subtract Mass

Reasoning and Problem Solving

The green parcel weighs 5 kg.
Can you work out what the blue and brown parcel weigh?

7 kg and 250 g

9 kg and 400 g



How much would the green and brown parcel weigh altogether?

Blue parcel = 4 kg
and 400 g

Brown parcel = 2
kg and 850 g

Green and brown
parcel = 7 kg and
850 g

Dora buys two peaches and three pears.

50 g

One peach weighs 75 g.



Three pears weigh the same as two
peaches.



How much does one pear weigh?

Measure Capacity (1)

Notes and Guidance

Children use litres, millilitres and standard scales to explore capacity. In this step, children focus on the capacity in either litres or millilitres and not as a mixed measurement, for example 5 l and 500 ml.

Children continue to use place value skills to explore scales. Children build on their knowledge from KS1, recognising the capacity is the amount of liquid a container can hold and the volume is how much liquid is in the container.

Mathematical Talk

What's the same and what's different about capacity and volume?

What does capacity mean? What does volume mean?

What do we measure capacity and volume in?

What unit of measure (ml or l) would we use to measure ____?

How much liquid is in the container?

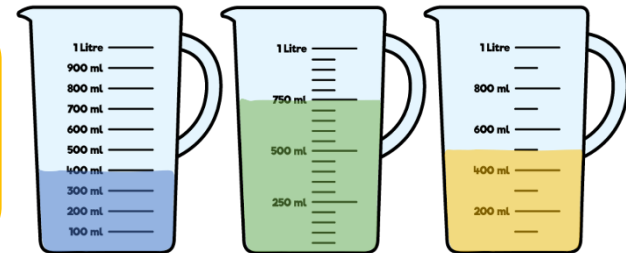
What is the scale going up in?

Varied Fluency

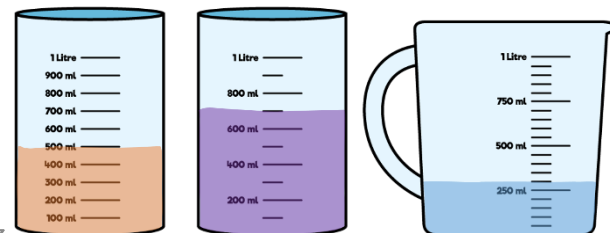
Use a variety of scales, discuss what's the same, what's different about the scales. Using different containers explore which measurement (litres or millilitres) would be used to measure the liquid inside. Discuss what things would be measured in litres and in millilitres.

Use the sentence stem to describe the capacity and volume of each container.

The volume of liquid is ____.
The capacity of the container is ____.



Identify what the scale is going up in to find out the volume in each container. Use the stem sentence.



The increments are in ____.
The volume is ____.

Measure Capacity (1)

Reasoning and Problem Solving

Use a variety of containers.
Can you estimate how much liquid they hold?
Check your estimates using measuring jugs and cylinders to see how accurate you were.

Children will use a variety of containers and gather a range of measurements. Encourage children to record their results in a table.

Use the clues to work out who has which container.



Annie

I have exactly half a litre



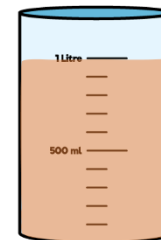
Amir

I have 1,000 ml

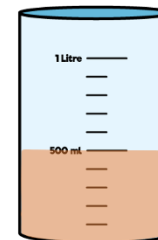


Eva

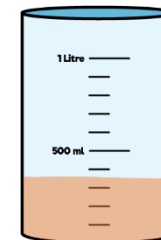
I have more than 300 ml but less than 400 ml



A



B



C

Annie has container B

Ron has container A

Eva has container C

Measure Capacity (2)

Notes and Guidance

Children use litres and millilitres and standard scales to explore capacity.

Children measure capacity with litres and millilitres together and record measurements as __ l and __ ml, for example 5 l and 500 ml.

Children continue to use place value skills to read and interpret scales.

Mathematical Talk

How many millilitres are in 1 litre? If we know this, what else do we know?

Look at the scale, show me where ____ would be.

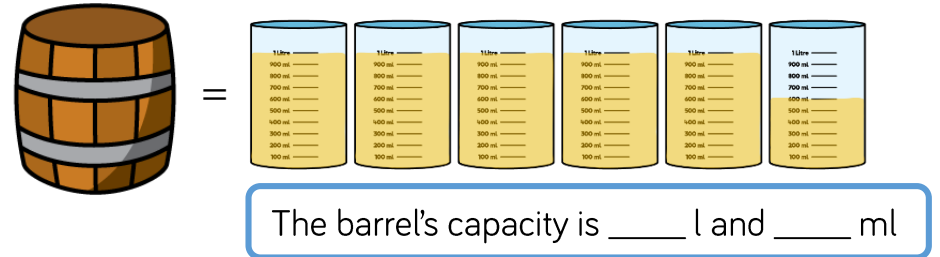
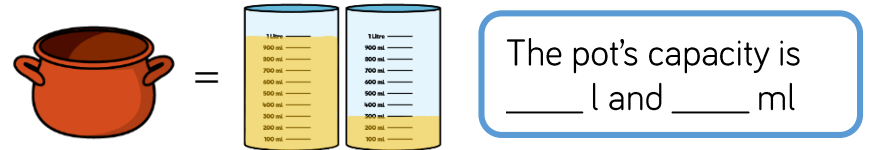
What is the capacity of the ____? How can we record this as l and ml?

How would I show how much water is left on the scale?

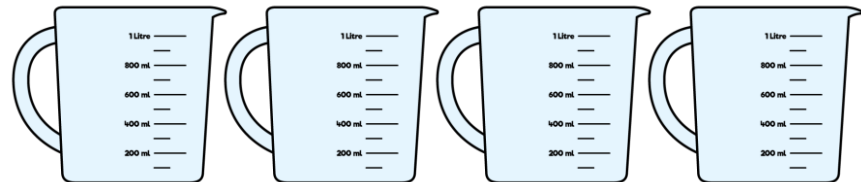
Varied Fluency

Use equipment and liquid to count in increments of 100 ml. Discuss what happens when you reach 1,000 ml. Explore other connections linked to this. For example, 2 l = 2,000 ml.

Complete the missing information.



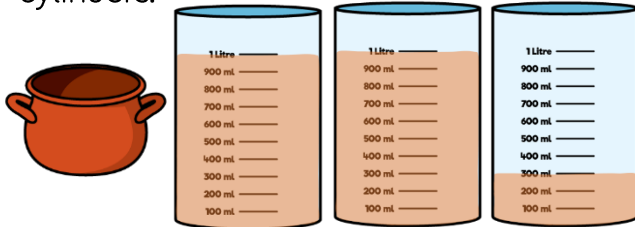
The capacity of the full fish bowl is 8 l and 750 ml. Hannah pours 5 l of water out of the bowl. Show how much water is left in the measuring jugs.



Measure Capacity (2)

Reasoning and Problem Solving

Amir and Alex work out the capacity of the pot by filling it with water, then pouring the water into the measuring cylinders.



The capacity of the pot is 302 ml

Amir

The capacity of the pot is 2 l and 300 ml.



Alex

Who do you agree with?
Explain why.

Alex is correct because there are 2 full litres and 300 millilitres in the third cylinder.

True or False?

The tallest container has the largest capacity.

Use containers to decide whether the statement is true or false.

Record the capacity of the different containers in a table.

Children will collect different measurements of capacities from different containers. Children will hopefully find that as well as height, the capacity of the container also depends on its width.

Compare Capacities

Notes and Guidance

Children continue to build on Year 2 and use 'full' and 'empty' to compare capacity.

They use their understanding that litres are used for larger containers and will use this to help them compare capacity. For example 500 ml is less than 5 l.

Children also compare actual numerical measures, including mixed measurements using the inequality symbols. For example, 1 l and 500 ml < 2 l.

Mathematical Talk

Which container is the most full?
Which container is the least full?

Which has the most liquid in it?
What does the liquid measure?

Which has the least liquid in it?
What does the liquid measure?

Varied Fluency

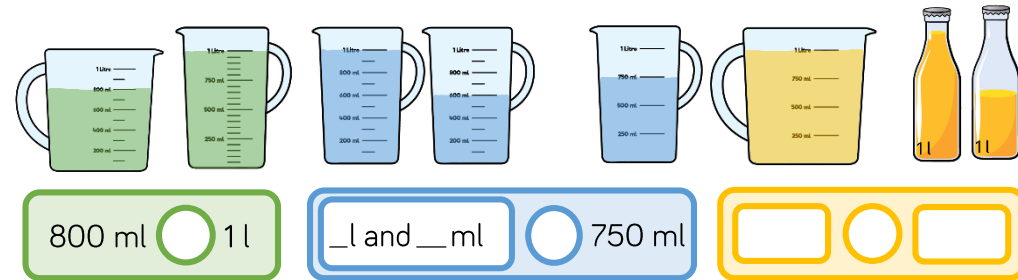
Complete the sentences.



cans of pop are equal to jug of orange juice.

1 can of pop is equal to jug of orange juice.

Use <, > or = to compare the volume of liquid in each pair of containers.



Whitney has 3 bottles of water with 500 ml in each.
Sophie has one bottle of water with 1 and a half litres in it.
Who has the most water?
Can you prove it?

Compare Capacities

Reasoning and Problem Solving

Rosie has a litre bottle of water.



She pours a drink for herself and two friends. Their glasses can hold up to 250 ml.



Teddy has more than Amir.
Rosie has the most.

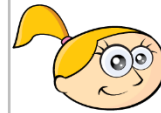
How much could each child have in their glass?

How much would be left in the bottle?

There are a range of possible answers the children could find. Rosie should have the most and Amir should have the least. The total should not exceed 750 ml

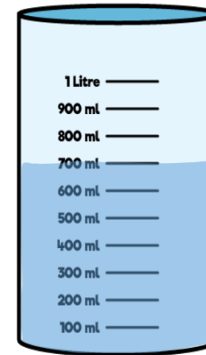
Possible answer:

Rosie: 250 ml
Teddy: 200 ml
Amir: 150 ml
There is 400 ml left in the bottle.

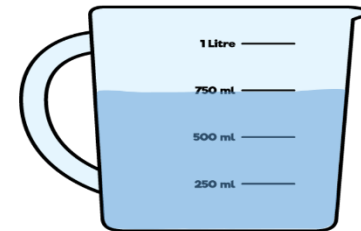


Eva

I know container 1 has more than container 2 in it because the water goes further up the side.



Container 1



Container 2

Is Eva correct? Explain your answer.

Eva is not correct. The measurements show that container 1 has 700 ml in it whereas container 2 has 750 ml in. Container 2 is wider than container 1 which is why it looks like it has less in it.

Add & Subtract Capacity

Notes and Guidance

Children add and subtract volumes and capacities. They can apply their understanding of different methods such as column addition/subtraction, finding the difference etc. Children should choose the correct method depending on the context of the problem. They continue to use mixed measures. Children may use concrete resources to represent litres and millilitres. Children could also use bar models to represent calculations.

Mathematical Talk

How many millilitres are in one litre? How could I show this using concrete resources?

How many litres are there in total?
How many millilitres are there in total?

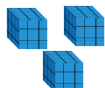
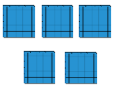

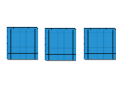
What methods can we use to add volumes or capacities?
What methods can we use to subtract volumes or capacities?

Varied Fluency


Teddy uses Base Ten and a place value chart to add 3 l and 500 ml and 3 l and 300 ml

Use the same approach to calculate:

- 4 l and 600 ml + 2 l and 100 ml
- 7 l and 320 ml + 1 l and 125 ml
- 3 l and 950 ml – 3 l and 50 ml
- 800 ml – 375 ml

| l | ml |
|---|---|
|  |  |
|  |  |
| 6 l | 800 ml |

To make Summer Punch for 2 people:



- 300 ml of pineapple juice
- 250 ml of orange juice
- 500 ml of lemonade

- How much liquid is used in total to make Summer Punch for 2 people?
- How much orange juice would be need to make enough for 4 people?
- Would a 1 l bottle of lemonade be enough to make drinks for 6 people?

Rosie keeps a record of how much milk she has in her café. Work out how much milk is used for each order.

| Amount of milk to start | Amount of milk used | Amount of milk left |
|-------------------------|---------------------|---------------------|
| 1 l and 430 ml | | 1 l and 100 ml |
| 1 l and 100 ml | | 890 ml |
| 890 ml | | 545 ml |

Add & Subtract Capacity

Reasoning and Problem Solving

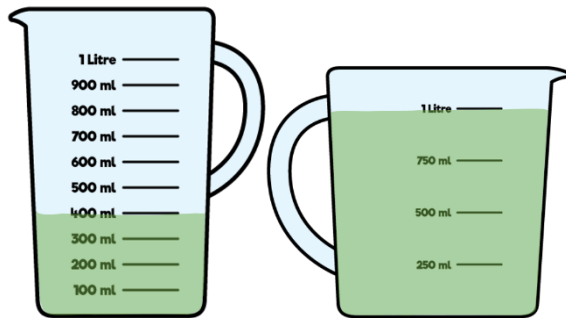
Tommy is pouring drinks using these jugs.

A drink is 125 ml.



Tommy

If I pour three more drinks using jug 2, both jugs will have the same amount of juice in.



Jug 1

Jug 2

Is Tommy correct?

If not, how much juice will be left in jug 2?

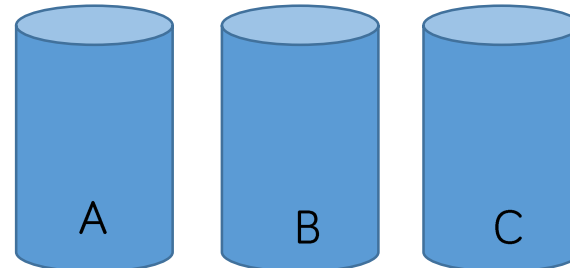
Tommy is not correct.
If Tommy makes three more drinks he will use a further 375 ml of juice.
 $1\text{ l} - 375\text{ ml} = 625\text{ ml}$

Here are some measuring cylinders.
The total liquid in all three cylinders is 400 ml.

Cylinder A has half of the total amount in it.

Cylinder B has 67 ml less than Cylinder A.

How much liquid does each cylinder contain?



A: 200 ml

B: 133 ml

C: 67 ml