ORIGO

STEPPING STONES

SAMPLE PAGES

CORE MATHEMATICS

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STUDENT JOURNAL

Step In Investigating Division Patterns

What is the same about each of these? What is different?

1 5 ones	÷ 3 = 5 ones
1 5 tens 0	÷ 3 = 5 tens
1 5 hundreds 0 0	÷ 3 = 5 hundreds
1 5 thousands 0 0 0	÷ 3 = 5 thousands

What is another way to say the numbers on the expanders?

15 tens ÷ 3 is the same as 150 ÷ 3.

I know that 150 ÷ 3 = 50 because 50 x 3 = 150.

What are the different ways you could say the answers to these?

18 tens ÷ 6 = _____

18 hundreds ÷ 6 = _____

18 thousands ÷ 6 = _____

Step Up

1. Divide the number on the expander. Then complete the division sentences.

a.

2 4 tens 0

24 tens ÷ 3 = ____ tens

_____ ÷ 3 = _____

b.

4 5 hundreds 0 0

45 hundreds ÷ 9 = ____ hundreds

_____ ÷ 9 = _____

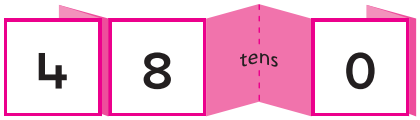
2. Divide the number on the expander. Then complete the division sentences.

a.

72 thousands ÷ 8 = ____ thousands

_____ ÷ 8 = _____

b.



48 tens ÷ 6 = ____ tens

_____ ÷ 6 = _____

3. Use a pattern to help you complete each of these.

a.

35 ÷ 7 = ____

350 ÷ 7 = ____

3500 ÷ 7 = ____

35 000 ÷ 7 = _____

b.

54 ÷ 6 = ____

540 ÷ 6 = ____

5400 ÷ 6 = ____

54 000 ÷ 6 = _____

c.

56 ÷ 8 = ____

560 ÷ 8 = ____

5600 ÷ 8 = ____

56 000 ÷ 8 = _____

d.

49 ÷ 7 = ____

490 ÷ 7 = ____

4900 ÷ 7 = ____

49 000 ÷ 7 = _____

Step Ahead

How could you use multiplication to work out 18 000 ÷ 6?
Write your thinking in words.

_____

_____

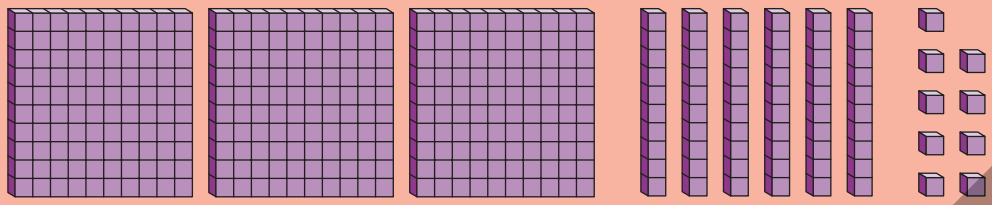
Step In Revising Division Strategies (Partitioning)

Jasmine bought a mobile phone for $369.
She paid for it in three equal monthly payments.

How could you work out the amount she paid each month?

12 ÷ 3 = 4
dividend divisor quotient

Daniel used a sharing strategy. What do the blocks represent?



How could you share these blocks into three equal groups?

Loop the blocks to show the amount in each share.

The amount that is paid each month can be called **P**.
P = 369 ÷ 3

Sora used a different strategy. He followed these steps.

Step 1	Step 2	Step 3
He drew a rectangle to show the problem. The length of one side becomes the unknown value.	He split the rectangle into parts so that it was easier to divide by 3.	He thought: 3 × 100 = 300 3 × 20 = 60 3 × 3 = 9
3 | 369 P	3 | 300 | 60 | 9	3 | 300 | 60 | 9 100 + 20 + 3

Why did he choose the numbers 300, 60 and 9?

Why did he add 100 + 20 + 3?

To find the amount, Daniel thinks 369 ÷ 3 = P and Sora thinks 3 x P = 369.

How much did Jasmine pay each month?

How could you use these strategies to calculate 484 ÷ 4?

Step Up

Use a strategy of your choice to complete each of these. Show your thinking.

a. $693 \div 3 =$ _____

b. $530 \div 5 =$ _____

c. $742 \div 7 =$ _____

d. $612 \div 6 =$ _____

e. $3906 \div 3 =$ _____

f. $8420 \div 4 =$ _____

Step Ahead

Break each number into parts that are easy to **divide by 5**.

a. 3050

b. 2530

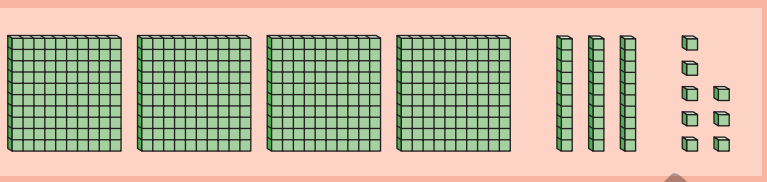
c. 4535

Step In Partitioning and Regrouping Dividends

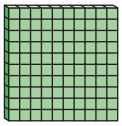
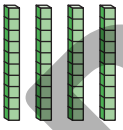
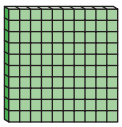
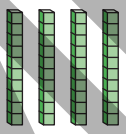
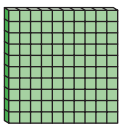
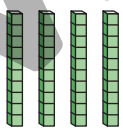
Imagine you are planning a holiday.

How could you work out the cost of one night at this hotel?

Dylan showed the total cost using base-10 blocks.



Then he followed these steps to calculate the cost of each night.

	Step 1 Share the hundreds.	Step 2 Share the tens.	Step 3 Share the ones.
3 Nights			
			
			

What did Dylan do at each step?

What is the cost of each night?

What is another way you could work it out?

Step Up

1. Draw or write the amount in each share. Use blocks to help you.

a.	456 ÷ 3
Shares	

b.	372 ÷ 3
Shares	

2. Use a strategy of your choice to complete each of these. You can use blocks to help. Show your thinking.

a. $620 \div 5 =$ _____

b. $375 \div 3 =$ _____

c. $528 \div 4 =$ _____

d. $429 \div 3 =$ _____

e. $4206 \div 3 =$ _____

f. $6250 \div 5 =$ _____

Step Ahead

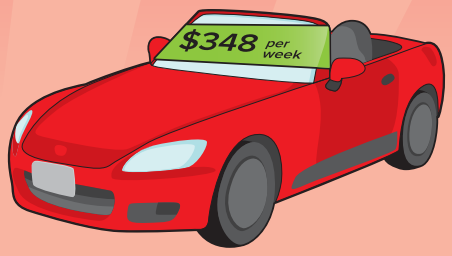
Look at the example below. Write two other ways to split 960 into parts to make it easy to divide by 4.

$960 \div 4$ **is the same as** $(800 \div 4) + (160 \div 4)$

a. $960 \div 4$ **is the same as** _____

b. $960 \div 4$ **is the same as** _____

Step In Recording Division



Three people share the cost of renting this car.

How could you work out each person's share?

Anna showed the total cost with blocks then followed these steps to work out each share.

	Step 1 Share the hundreds.	Step 2 Share the tens.	Step 3 Share the ones.
Shares			
			
			

Haroon followed these steps to help him write the amount in each share.

	Step 1 Share the hundreds.	Step 2 Share the tens.	Step 3 Share the ones.
Shares	100	100 + 10	100 + 10 + 6
	100	100 + 10	100 + 10 + 6
	100	100 + 10	100 + 10 + 6

How much is each person's share of the car rental?

Step Up

1. Work out how much two people, then four people would pay to share the same total cost of the car rental above. Use a strategy of your choice.

a.	$348 ÷ 2
Shares	

b.	$348 ÷ 4
Shares	

2. Work out the amount in each share. You can use blocks to help your thinking.

a. $512 ÷ 4 = $ _____

100
100
100
100

b. $798 ÷ 6 = $ _____

c. $847 ÷ 7 = $ _____

d. $732 ÷ 6 = $ _____

e. $648 ÷ 4 = $ _____

f. $573 ÷ 3 = $ _____

g. $4230 ÷ 3 = $ _____

1000
1000
1000

h. $5631 ÷ 3 = $ _____

Step Ahead

For each of these, write a digit to complete a three-digit number that you can divide without any amount left over. Then write the answers.

a. 5 8 ___ ÷ 3 = _____

b. 6 2 ___ ÷ 5 = _____

c. 6 ___ 8 ÷ 4 = _____

d. 7 ___ 9 ÷ 3 = _____

Step In Solving Word Problems Involving Division

Callon wants to go on a cruise but cannot decide which package to choose.

What is the cost of a 4-night cruise? What does each night cost?

What strategy could you use to work it out?

I regrouped 5 hundreds and 2 tens for 52 tens. 52 tens ÷ 4 is 13 tens.

Work out the cost of one night for each of the cruise packages. What strategies did you use?

Callon chose the cruise package for 10 nights and pays an extra $200 to upgrade his room.
What does it now cost to stay each night? How do you know?

That's... $1150 ÷ 10. I could use a place-value strategy to work out the answer.

Step Up

1. Work out the cost of one night for each of these cruise packages. Write a number sentence to show your thinking.

a. 5 nights	b. Stay 6 nights
$ _____ each night	$ _____ each night
c. 8 nights	**d. 10 nights**
$ _____ each night	$ _____ each night

2. Solve these word problems. Write number sentences to show your thinking.

a. A cruise costs $840 for 5 nights. Grace pays an extra $90 to upgrade her room. How much does Grace now pay for each night?

$ _____

b. A cruise ship has a capacity of 1250 passengers. Each lifeboat carries 150 passengers. How many lifeboats are needed on the ship?

_____ lifeboats

c. A group of 4 friends book a snorkelling package. The total cost of equipment is $396 and the total cost of transport is $120. How much will each person pay?

$ _____

d. Six friends have dinner at one of the ship's restaurants. The dinner costs $348 and the friends agree to give a tip of $5 each. What equal amount will each of them pay?

$ _____

e. At a pool party, every fourth guest is given a grass skirt. There are 160 guests at the party. How many grass skirts are given out to guests?

_____ grass skirts

f. The cinema on the ship seats 144 guests. The seats are arranged in 9 equal rows. The first 5 rows are full of guests. How many guests are in the cinema?

_____ guests

Step Ahead

Three friends share the cost of a taxi from the harbour back to the city. The cost of the taxi is $70. What amount could they each pay?

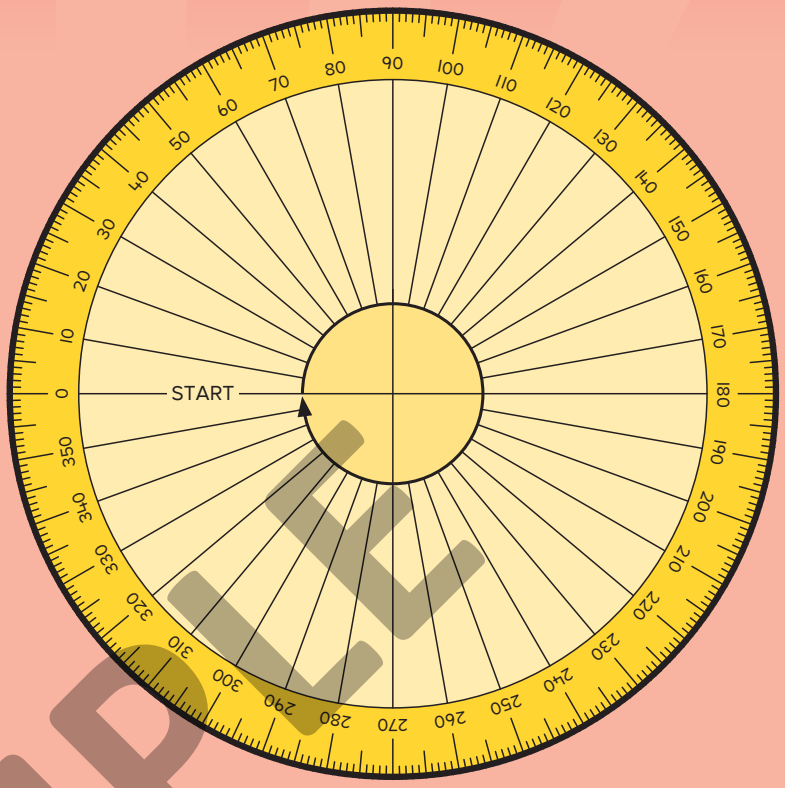
Friend 1 $ _____ Friend 2 $ _____ Friend 3 $ _____

Step In Introducing Protractors and Degrees

One full turn around a point can be divided into 360 parts.

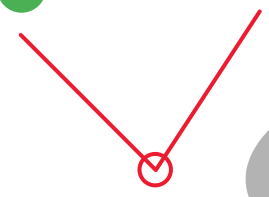
Each part is called a **degree** and is $\frac{1}{360}$ of a full turn.

> The symbol ° is used for degree. One full turn around a point is 360°.

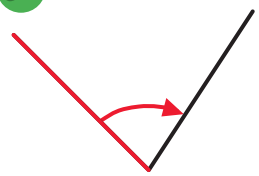


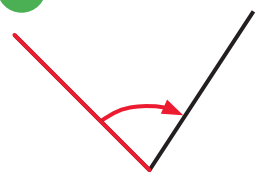
Look at the protractor on the right.
A protractor is a tool used to measure angles.

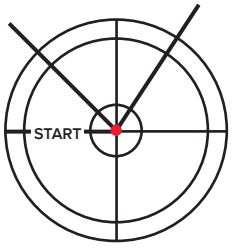
Follow these steps to use your protractor.

1. 
Identify the angle arms and rotation point.

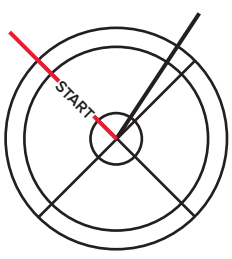
2. 
Choose which angle to measure. There are two possible choices.

3. 
Visualise which angle arm has to move clockwise to the other to show the amount of turn.

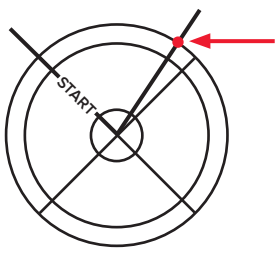
4. 
Estimate the amount of turn, for example, is it more or less than 90 degrees?

5. 

Place the centre of the protractor on the rotation point of the angle.

6. 

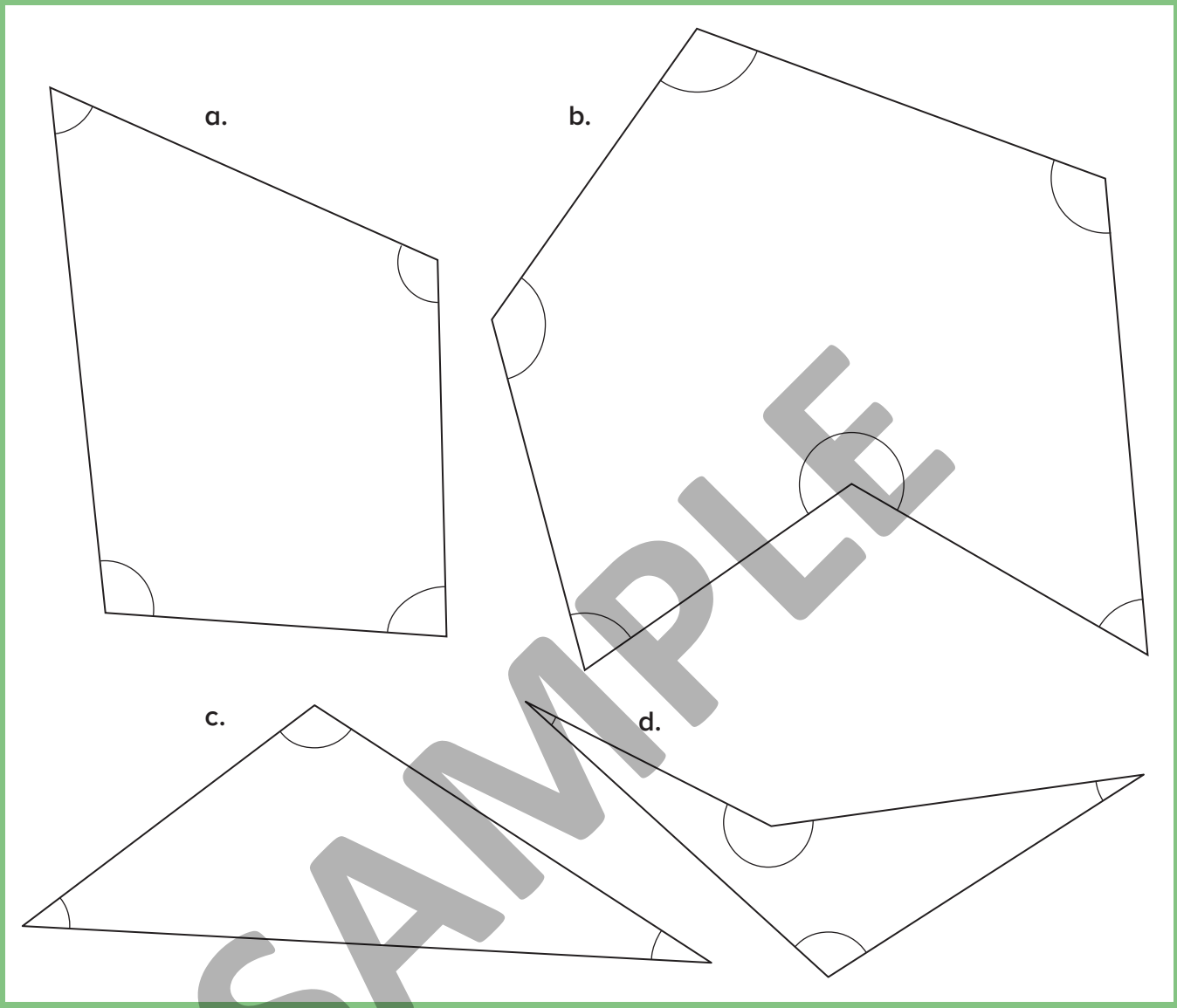
Place the protractor's START line on the angle arm that you imagine moving to the other.

7. 

Find the protractor mark that lies on top of the second angle arm.

Step Up

Use a protractor to measure and label the inside angles of each shape.



Step Ahead

a. Draw two connecting line segments that show an angle of 60° between them.

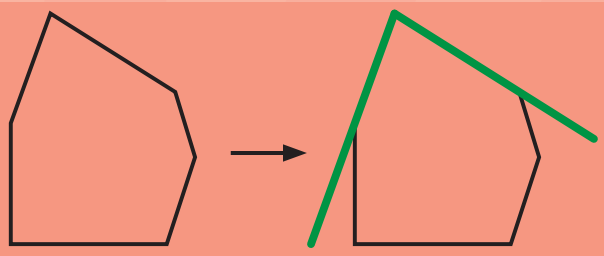
b. What fraction of a full turn is 60°?

_____

Step In Measuring and Drawing with a Protractor

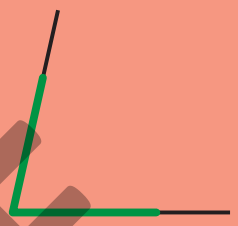
Some angles have short angle arms that can make it difficult to measure with a protractor.

You can use a ruler to extend the angle arms as shown on the right.



Sometimes you have to draw angles with short arms.

You can use a ruler to draw longer arms lightly as shown on the right to make measuring the correct lengths easier.



What else would be useful to consider when measuring and drawing angles?

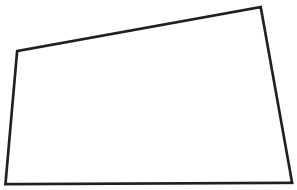
I would think about how close an angle is to a reference angle like 90°, 180° or 270°. This will help me know if my measurement is reasonable.

Step Up

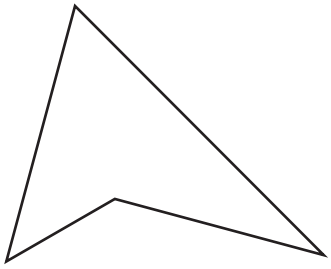
1. Use a protractor to measure each interior angle. Extend the sides if necessary.

a.

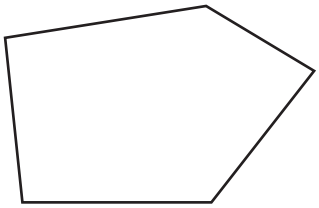
b.



c.



d.



2. Use a protractor to draw angle arms that match each label.

a. Angle size = 35° Arm length = 3 cm

b. Angle size = 106° Arm length = 4 cm

3. Use a protractor to draw a hexagon like this  . Each interior angle should be 120° and each side should be 30 mm long. The first side has been drawn for you.

Step Ahead

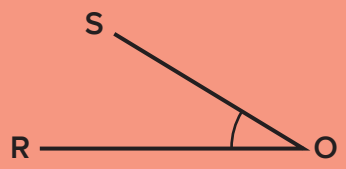
Draw the triangle from Question 1 but double the length of each side. Turn the triangle 90° to fit it in the space below.

Step In Estimating and Calculating Angles

Angles can be identified by labelling the endpoints of their angle arms and the point where the arms meet. When using points to name an angle, the point that refers to the vertex must be in the middle.

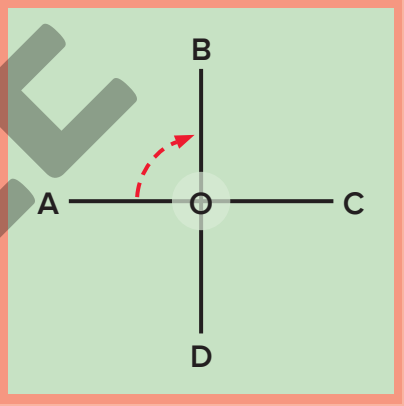
This angle can be called Angle ROS.

What other name could be used?
How do you know?



RO is one of the angle arms. What is the other angle arm?

Look at this diagram.
Imagine OA turned clockwise to finish at the same position as OB.



What fraction of a full turn would OA have made?

How many degrees would it have turned? How do you know?

What does that tell you about Angle AOB?

I think it is one-quarter of a full turn. A full-turn is 360 degrees so I need to work out one-quarter of 360.

Step Up

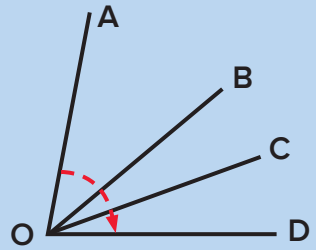
I. Use the clues to calculate the size of each angle in the diagram. Do not use a protractor. Show your thinking.

Clues

- Angle **BOD** is 40°.
- Angle **COD** is half of Angle **BOD**.
- Angle **AOB** is the same size as Angle **BOD**.

Angle **COD** is _____ °

Angle **AOB** is _____ °



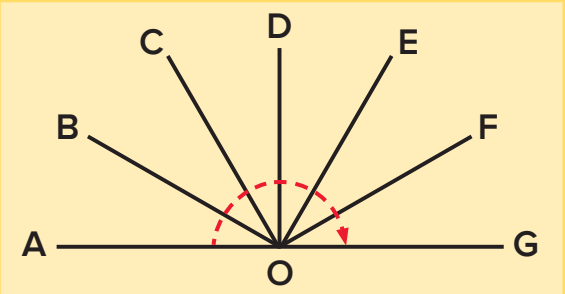
Angle **AOD** is _____ °

Angle **AOC** is _____ °

2. Look at the diagram. Use the clues to calculate the size of each angle.
Do not use a protractor. Show your thinking.

Clues

- Angle **AOB** is 30°.
- Angle **BOC** is 30°.
- Angle **COD** is 30°.
- Angle **DOE** is 30°.
- Angle **EOF** is 30°.
- Angle **FOG** is 30°.



Angle **AOC** is _____ °

Angle **AOD** is _____ °

Angle **EOG** is _____ °

Angle **AOE** is _____ °

Angle **BOE** is _____ °

Angle **AOG** is _____ °

3. Look at the diagram in Question 2. Name three angles that are **less than 90°**.

_____ _____ _____

4. Look at the diagram in Question 2. Name three angles that are **greater than 90°**.

_____ _____ _____

Step Ahead

Look at the diagram in Question 2 above. Write these angle sizes.

Angle **BOD** is _____ °

Half of Angle **BOD** is _____ °

Angle **BOF** is _____ °

Half of Angle **BOF** is _____ °

Angle **BOC** is _____ °

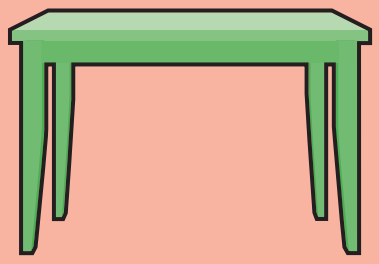
One-third of Angle **BOC** is _____ °

Angle **DOG** is _____ °

One-third of Angle **DOG** is _____ °

Step In Identifying Angle Arms

Where might you see angles with two visible angle arms?



What do you know about the gauges you might see in a car?
What does the needle do in these gauges?

Look at this fuel gauge. What does it show?

What will happen when the car is filled with fuel?
Where is the vertex of this angle?
Where are the angle arms?

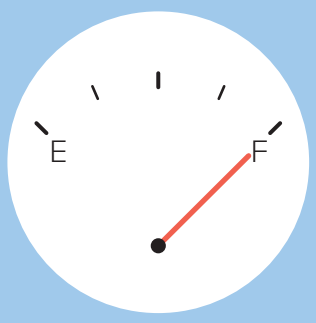
Look at the fuel gauge now. How much of a full turn did the needle make? How do you know?

What other places might you see an angle with only one visible angle arm?

Step Up

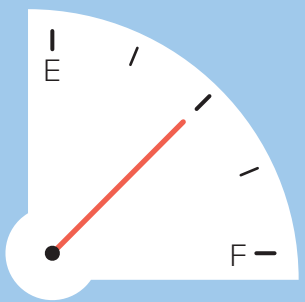
1. Estimate the amount of turn each needle has made from **E**. Write your answer in degrees.

a.



_____

b.



_____

c.

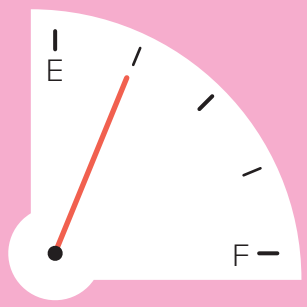
_____

2. Estimate the amount of turn each needle has made from **E**. Write your answer in degrees.

a.

_____

b.



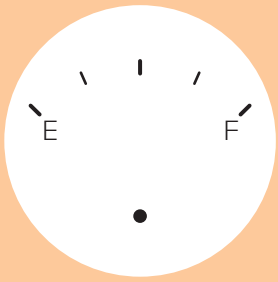
_____

c.

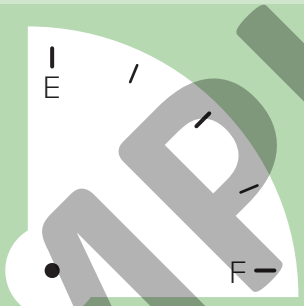
_____

3. Draw the new position of the needle to show the amount of turn from **E**.

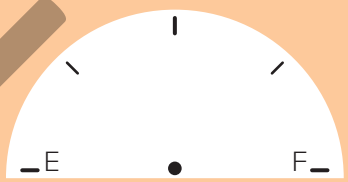
a. 45°



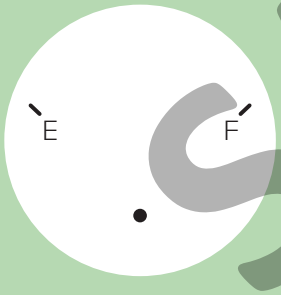
b. 90°



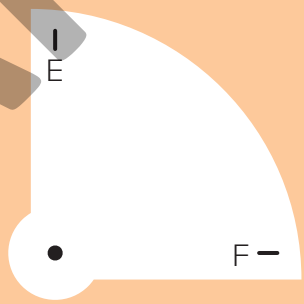
c. 30°



d. 60°



e. 15°



f. 120°

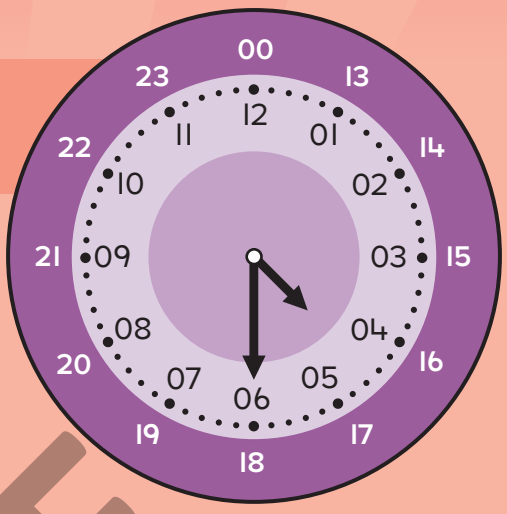
Step Ahead

Use a protractor to find the exact measure of each angle in Questions 1 and 2. Write the answers below.

Question 1	**a.**	_____	**b.**	_____	**c.** _____
Question 2	**a.**	_____	**b.**	_____	**c.** _____

Step In Reading and Writing 24-Hour Times

This clock shows 24-hour time.
What do you know about 24-hour times?



At what time does each day start?

How many hours has it been since today started?

How many hours is it from the start of the day until school finishes?

How would you write half past four as a 24-hour time?

Half past four in the morning is written as 0430 and half past four in the afternoon is written as 1630.

Step Up

1. Write these as 12-hour times. Use am or pm.

a. 8 hours after midnight _____	**b.** 14 hours after midnight _____
c. 11 hours after midnight _____	**d.** 3 hours before midday _____
e. $7\frac{1}{2}$ hours before noon _____	**f.** $4\frac{3}{4}$ hours before midnight _____

2. Write these as 24-hour times.

a. 4 pm _____	**b.** 10 am _____	**c.** 10 pm _____
d. 2 am _____	**e.** 12 noon _____	**f.** 7 pm _____
g. 4:45 pm _____	**h.** 6:15 pm _____	**i.** 7:22 pm _____

3. Write each time as 12-hour and 24-hour times.

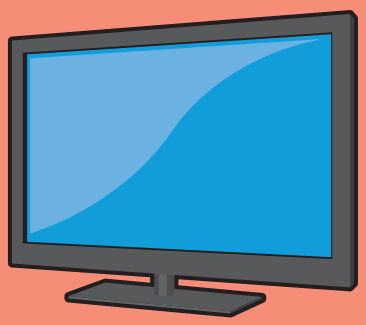
Flight Information	12-Hour Time	24-Hour Time
a. Flight AF35 departs at twelve minutes past four in the afternoon.		
b. Flight BG63 arrives at half past eight in the morning.		
c. Flight CW71 arrives at quarter past ten at night.		
d. Flight DF16 departs at twenty minutes to five in the morning.		
e. Flight EK142 arrives at six-thirty in the morning.		
f. Flight FT25 departs at five minutes past one in the afternoon.		

4. Write why you think 24-hour time is used by airlines.

Step Ahead

Write the time you usually begin these **afternoon** and **evening** activities in 24-hour time.

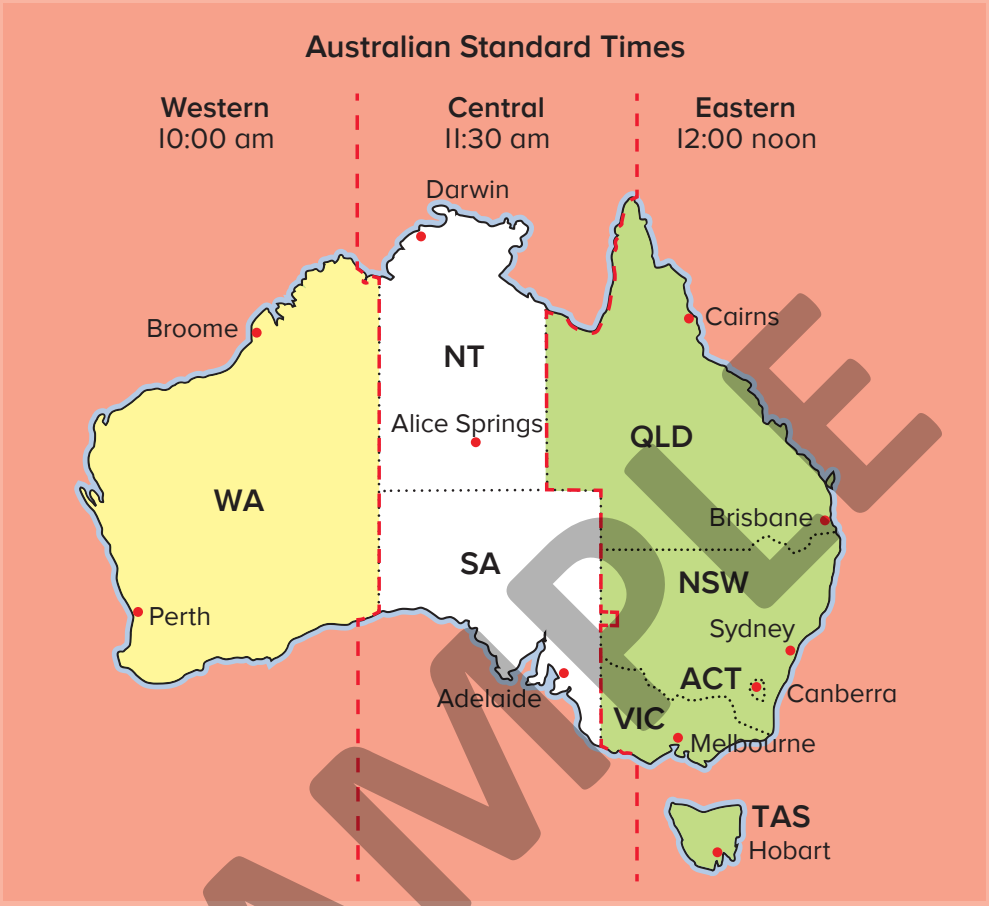
Activity	Finish time (24-hour time)
Leave school	
Do homework	
Eat dinner	
Brush teeth	
Go to bed	



Step In Working with Australian Time Zones

What do you know about different time zones?

This map of Australia is separated into three time zones.



Look at the time differences across the top of the map.

When you move east from a time zone, you have to add a number of hours.

When you move west from a time zone, you subtract a number of hours.

Step Up

1. List the Australian states and territories in each time zone.

a. Eastern _____

b. Central _____

c. Western _____

2. Use the map on page 196 to help answer Questions 2 and 3.

a. The flight from Brisbane to Perth leaves at 10:45 am. What time is that in Perth? _____

b. When it is 9:15 pm in Adelaide, what time is it in Broome? _____

c. The cricket test begins in Perth at 10:30 am. What time is that in Sydney? _____

3. Write the missing times.

a.

Brisbane	Broome
12:00 noon	
6:00 pm	
	9:00 pm
2:45 am	
	3:15 pm

b.

Darwin	Sydney
	12:00 midnight
7:00 pm	
	2:00 am
6:45 am	
	1:30 pm

c.

Alice Springs	Perth
	2:00 pm
9:00 am	
	9:00 pm
7:12 am	
	5:42 pm

d.

Hobart	Adelaide
	9:00 am
4:00 pm	
	8:30 pm
3:07 am	
	11:59 pm

Step Ahead

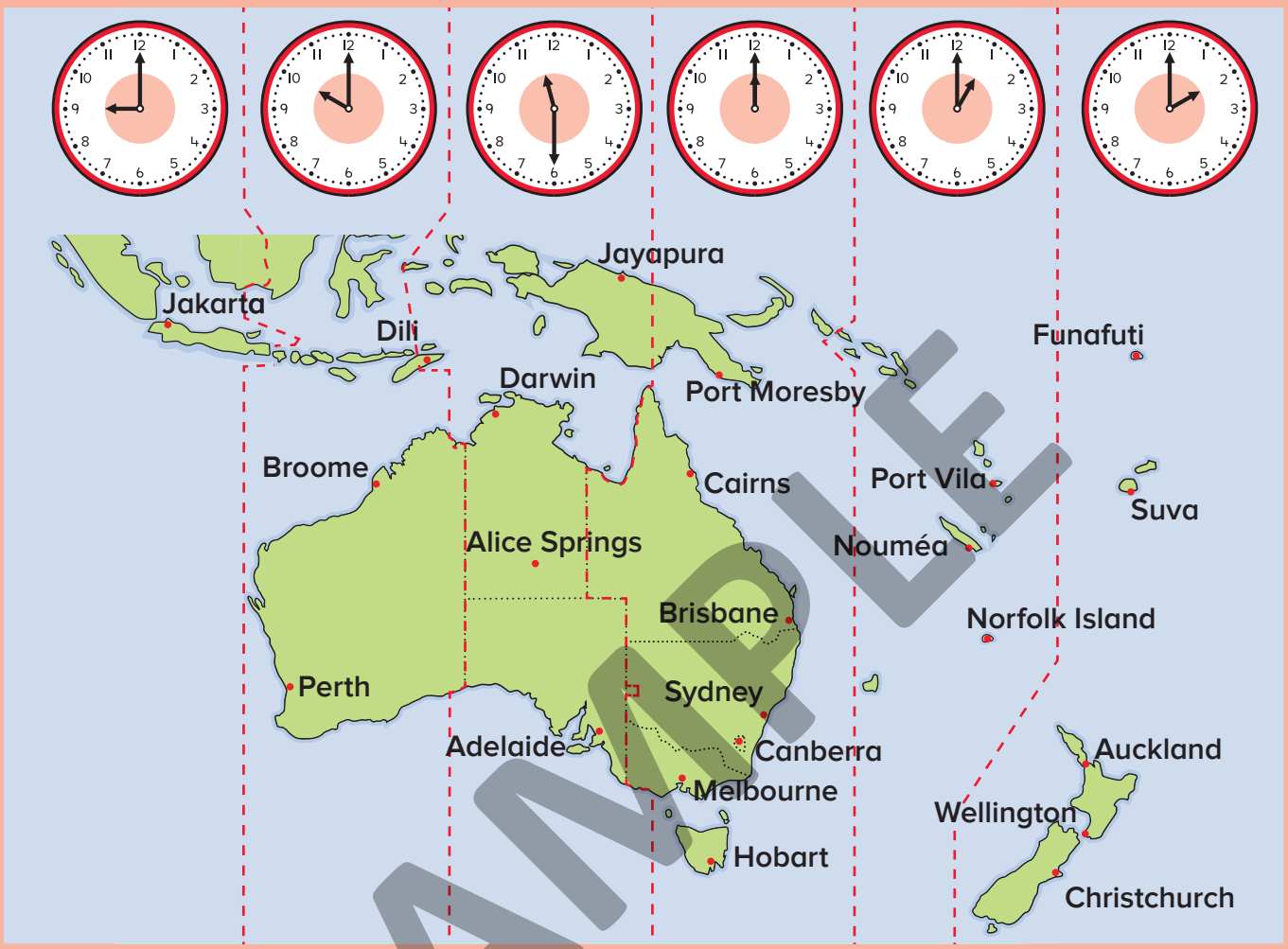
During the warmer months of the year South Australia, New South Wales, Australian Capital Territory, Victoria and Tasmania advance their clocks forwards by one hour. This is called **Australian Daylight Savings Time**.

During this period, if it is **6:00 am in Brisbane**, what will be the time in each other capital city?

Melbourne	Adelaide	Darwin	Perth	Hobart	Sydney	Canberra

Step In Working with International Time Zones

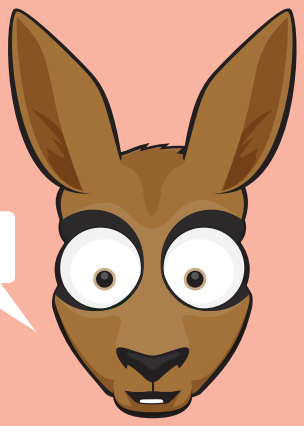
This map shows the different time zones in and around Australia.



How does the time change when you travel from the east to the west?

How does the time change when you travel from the west to the east?

Imagine you are planning a holiday in New Zealand.



What are some things you should consider when booking your flights?

The flight from Melbourne to Christchurch takes 3 hours. If you depart from Melbourne at 10:00 pm, what time will you arrive in Christchurch? How did you work it out?

The flight from Perth to Christchurch takes 6 hours and 18 minutes. If you depart from Perth at 10:00 pm, what time will you arrive in Christchurch? How did you work it out?

At what time would you need to fly out of Christchurch to return to Perth by 8 o'clock in the morning? How do you know?

Step Up

Use the map on page 198 to complete these.

1. Write one place that is in each of these time zones.

a. Three hours ahead of Jakarta _____

b. Four hours ahead of Perth _____

2. How many hours ahead of Jakarta are these places?

a. Port Vila _____ hours

b. Broome _____ hour

c. Adelaide _____ hours

3. Imagine it is 11:29 pm on Tuesday in Alice Springs.

a. Name two places where it is the same time.

_____ _____

b. Name two places where it is just before 2 o'clock in the morning on Wednesday.

_____ _____

c. Name two places where it is nearly 1:00 am on Wednesday.

_____ _____

Step Ahead

Look at the map on page 198. Write the names and times for some places in other time zones.

Time where you live	Other city	Time in other city
a. 		:
		:
b. 		:
		: