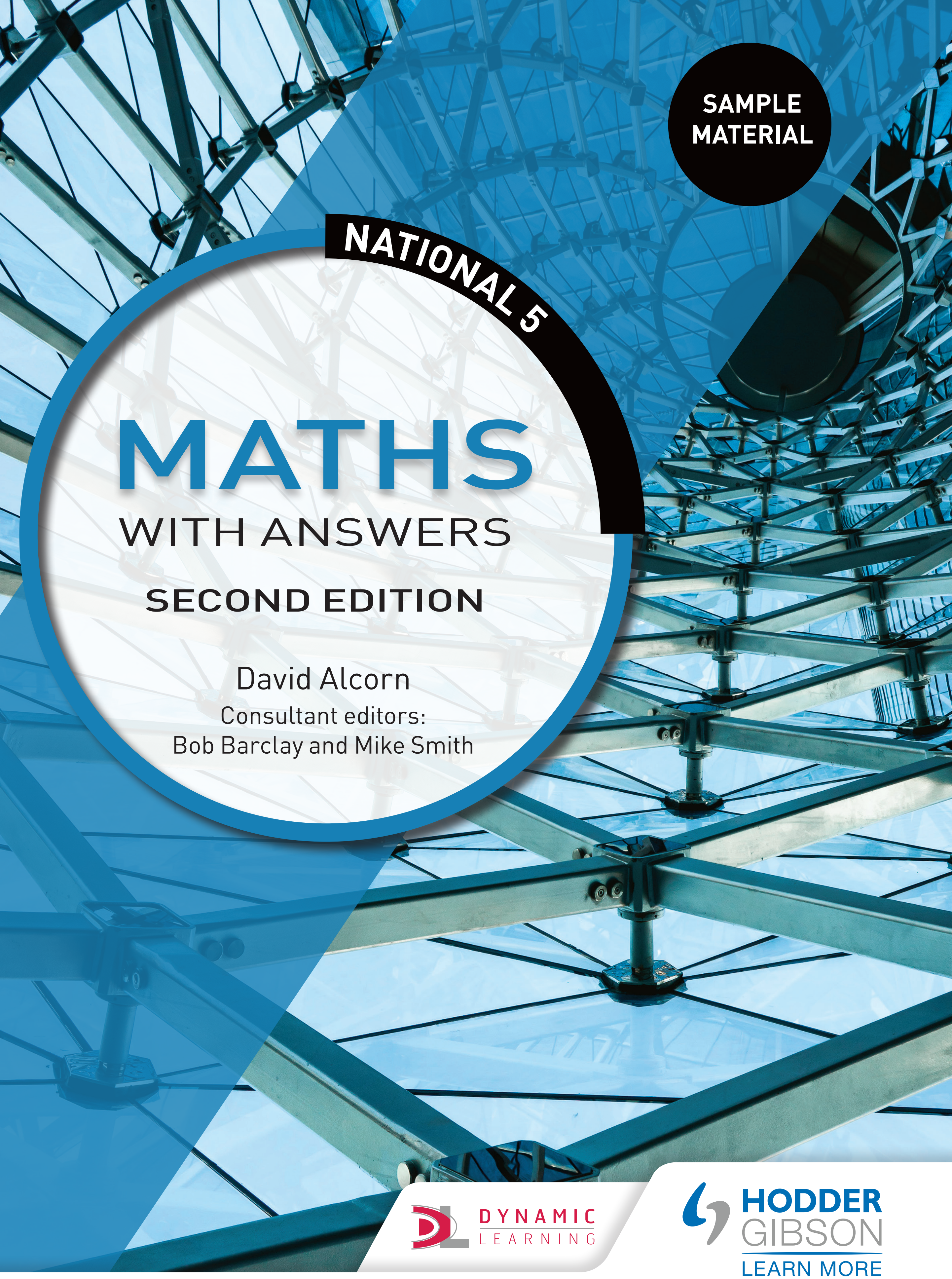

SAMPLE MATERIAL

NATIONAL 5

MATHS

WITH ANSWERS

SECOND EDITION

David Alcorn

Consultant editors:
Bob Barclay and Mike Smith

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PREFACE

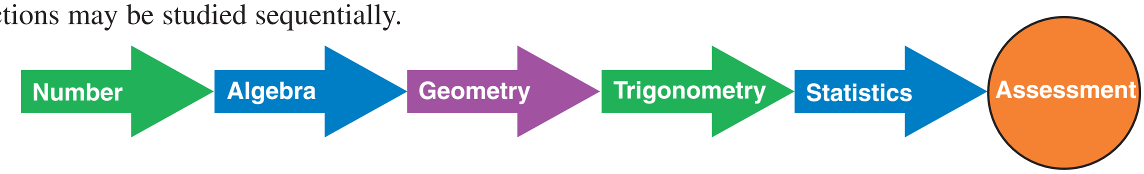
National 5 Maths Second Edition has been specifically written to meet the latest requirements of the SQA Mathematics Course and provides full coverage of the specifications of the **SQA Mathematics (National 5) Course**.

In preparing the text, full account has been made of the requirements for students to be able to use and apply mathematics in written examination papers and be able to solve problems both with and without a calculator.

To provide efficient, yet flexible, coverage of the specifications, the book has been split into sections.

Chapters	1 - 5	**Number**
Chapters	6 - 14	**Algebra**
Chapters	15 - 20	**Geometry**
Chapters	21 - 24	**Trigonometry**
Chapters	25 - 26	**Statistics**

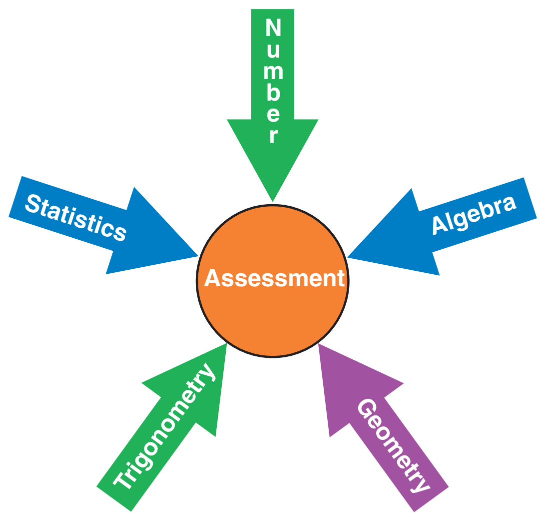
Sections may be studied sequentially.



Alternatively, you may wish to study material from different chapters across all five sections.

The chapters within each unit have been organised to facilitate either approach.

You can best decide the approach to use depending on the individual needs of the students.



Each chapter consists of fully worked examples with explanatory notes and commentary, carefully graded questions, a summary of key points and a review exercise.
The review exercises provide the opportunity to consolidate topics introduced in the chapter and an efficient method of monitoring progress through the course.

Some chapters include ideas for investigation. These give students the opportunity to improve and practise their skills of using and applying mathematics.

Twelve revision exercises, organised to provide practice for non-calculator and calculator papers, provide opportunities to consolidate skills acquired during the course.

As final preparation for the exams, a further compilation of exam practice questions has been provided, which has been organised for non-calculator paper and calculator paper practice.

CONTENTS

Trigonometry Chapters 21 - 24

Statistics Chapters 25 - 26

Revision Exercises

Exam Practice

1 Approximation

Whole numbers and decimals

The numbers 0, 1, 2, 3, 4, 5, … can be used to count objects.
Such numbers are called **whole numbers**.

Our number system is made up of the digits 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9.
The position a digit has in a number is called its **place value**.
In the number 5384 the digit 8 is worth 80, but in the number 4853 the digit 8 is worth 800.

Numbers and quantities are not always whole numbers.
The number system can be extended to include **decimal numbers**.

A **decimal point** is used to separate the whole number part from the decimal part of the number.

73.26 This number is read as seventy-three point two six.

whole number, 73 decimal part, 2 tenths + 6 hundredths (which is the same as 26 hundredths)

Many measurements are recorded using decimals, including money, time, distance, weight, volume, etc.

Approximation

In real-life it is not always necessary to use exact numbers. A number can be **rounded** to an **approximate** number. Numbers are rounded according to how accurately we wish to give details.
For example, the distance to the Sun can be given as 93 million miles.

Can you think of other situations where approximations might be used?

Rounding using decimal places

What is the cost of 1.75 metres of material costing £3.99 a metre?

$1.75 \times 3.99 = 6.9825$

The cost of the material is £6.9825 or 698.25p.
As you can only pay in pence, a sensible answer is £6.98, correct to two decimal places (nearest penny).
This means that there are only two decimal places after the decimal point.

Often it is not necessary to use an exact answer. Sometimes it is impossible, or impractical, to use the exact answer.

To round a number to a given number of decimal places

When rounding a number to one, two or more decimal places:

1. Write the number using one more decimal place than asked for.
2. Look at the last decimal place and
   - if the figure is 5 or more round up,
   - if the figure is less than 5 round down.
3. When answering a problem remember to include any units and state the degree of approximation used.

Example 1

Write 2.76435 to 2 decimal places.

Look at the third decimal place. **4**
This is less than 5, so, round down.
Answer 2.76

Example 2

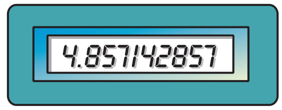
Write 7.104 to 2 decimal places.
7.104 = 7.10 to 2 d.p.
The zero is written down because it shows the accuracy used, 2 decimal places.

Notation: Often decimal place is shortened to d.p.

Practice Exercise **1.1**

1. Write the number 3.9617 correct to
(a) 3 decimal places, (b) 2 decimal places, (c) 1 decimal place.

2. The display on a calculator shows the result of $34 \div 7$.
What is the result correct to two decimal places?



3. 

The scales show Gary's weight.
Write Gary's weight correct to one decimal place.

4. Copy and complete this table.

Number	2.367	0.964	0.965	15.2806	0.056	4.991	4.996
d.p.	1	2	2	3	2	2	2
Answer	2.4						

5. Carry out these calculations giving the answers correct to
(a) 1 d.p. (b) 2 d.p. (c) 3 d.p.
(i) 6.12×7.54 (ii) 89.1×0.67 (iii) 90.53×6.29
(iv) $98.6 \div 5.78$ (v) $67.2 \div 101.45$

6. In each of these short problems decide upon the most suitable accuracy for the answer.
Then calculate the answer. Give a reason for your degree of accuracy.
(a) One gallon is 4.54596… litres. How many litres is 9 gallons?
(b) What is the cost of 0.454 kg of cheese at £9.47 per kilogram?
(c) The total length of 7 equal sticks, lying end to end, is 250 cm. How long is each stick?
(d) A packet of 6 bandages costs £7.99. How much does one bandage cost?
(e) Petrol costs 133.9 pence a litre. I buy 15.6 litres. How much will I have to pay?

Rounding using significant figures

Consider the calculation $600.02 \times 7500.97 = 4500732.0194$
To 1 d.p. it is 4500732.0, to 2 d.p. it is 4500732.02.
The answers to either 1 or 2 d.p. are very close to the actual answer and are almost as long.
There is little advantage in using either of these two roundings.
The point of a rounding is that it is a more convenient number to use.

Another kind of rounding uses **significant figures**.
The **most** significant figure in a number is the figure which has the greatest place value.

Consider the number 237.
The figure 2 has the greatest place value. It is worth 200.
So, 2 is the most significant figure.

In the number 0.00328, the figure 3 has the greatest place value.
So, 3 is the most significant figure.

> Noughts which are used to locate the decimal point and preserve the place value of other figures are not significant.

To round a number to a given number of significant figures

When rounding a number to one, two or more significant figures:
1. Start from the most significant figure and count the required number of figures.
2. Look at the next figure to the right of this and
   - if the figure is 5 or more round up,
   - if the figure is less than 5 round down.
3. Add noughts, as necessary, to locate the decimal point and preserve the place value.
4. When answering a problem remember to include any units and state the degree of approximation used.

Example 3

Write 4 500 732.0194 to 2 significant figures.

The figure after the first 2 significant figures **45** is 0.
This is less than 5, so, round down, leaving 45 unchanged.
Add noughts to 45 to locate the decimal point and preserve place value.
So, 4 500 732.0194 = 4 500 000 to 2 sig. fig.

Notation:
Often significant figure is shortened to sig. fig.

Example 4

Write 0.000364907 to 1 significant figure.

The figure after the first significant figure **3** is 6.
This is 5 or more, so, round up, 3 becomes 4.
So, 0.000364907 = 0.0004 to 1 sig. fig.

Notice that the noughts before the 4 locate the decimal point and preserve place value.

Choosing a suitable degree of accuracy

In some calculations it would be wrong to use the complete answer from the calculator.
The result of a calculation involving measurement should not be given to a greater degree of accuracy than the measurements used in the calculation.

Example 5

What is the area of a rectangle measuring 4.6 cm by 7.2 cm?

$4.6 \times 7.2 = 33.12$
Since the measurements used in the calculation (4.6 cm and 7.2 cm) are given to 2 significant figures the answer should be as well.
33 cm² is a more suitable answer.

Note:
To find the area of a rectangle: multiply length by breadth.

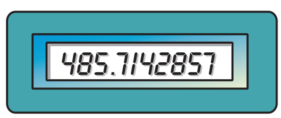
Practice Exercise 1.2

1. Write these numbers correct to one significant figure.
(a) 17 (b) 523 (c) 350 (d) 1900 (e) 24.6
(f) 0.083 (g) 0.086 (h) 0.00948 (i) 0.0095

2. Copy and complete this table.

Number	456 000	454 000	7 981 234	0.000567	0.093748	0.093748
sig. fig.	2	2	3	2	2	3
Answer	460 000					

3. This display shows the result of $3400 \div 7$.
What is the result correct to two significant figures?



4. Carry out these calculations giving the answers correct to
(a) 1 sig. fig. (b) 2 sig. fig. (c) 3 sig. fig.
(i) 672×123 (ii) 6.72×12.3 (iii) 78.2×12.8
(iv) $7.19 \div 987.5$ (v) $124 \div 65300$

5. A rectangular field measures 18.6 m by 25.4 m.
Calculate the area of the field, giving your answer to a suitable degree of accuracy.

6. In each of these short problems decide upon the most suitable accuracy for the answer.
Then work out the answer, remembering to state the units.
Give a reason for your degree of accuracy.
(a) The area of a rectangle measuring 13.2 cm by 11.9 cm.
(b) The area of a football pitch measuring 99 m by 62 m.
(c) The total length of 13 tables placed end to end measures 16 m. How long is each table?
(d) The area of carpet needed to cover a rectangular floor measuring 3.65 m by 4.35 m.

Key Points

- In real-life it is not always necessary to use exact numbers. A number can be **rounded** to an **approximate** number. Numbers are rounded according to how accurately we wish to give details. For example, the distance to the Sun can be given as 93 million miles.
- You should be able to approximate using **decimal places**.

> Write the number using one more decimal place than asked for.
> Look at the last decimal place and
> - if the figure is 5 or more round up,
> - if the figure is less than 5 round down.

- You should be able to approximate using **significant figures**.

> Start from the most significant figure and count the required number of figures.
> Look at the next figure to the right of this and
> - if the figure is 5 or more round up,
> - if the figure is less than 5 round down.
>
> Add noughts, as necessary, to preserve the place value.

- You should be able to choose a suitable degree of accuracy.

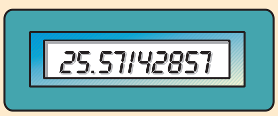
> The result of a calculation involving measurement should not be given to a greater degree of accuracy than the measurements used in the calculation.

Review Exercise 1

1. Write these numbers correct to 2 decimal places.
(a) 28.714 (b) 6.91288 (c) 12.397 (d) 0.0418 (e) 0.00912

2. Write these numbers correct to 3 significant figures.
(a) 2313 (b) 23.58 (c) 36.97 (d) 503.89 (e) 0.0005646

3. The display shows the result of $179 \div 7$.
What is the result correct to:
(a) two decimal places,
(b) one decimal place,
(c) one significant figure?



4. Calculate 7.25×0.79
(a) to 1 decimal place, (b) to 2 decimal places, (c) to 3 decimal places.

5. Calculate $107.9 \div 72.5$ (a) to 1 significant figure, (b) to 2 significant figures.

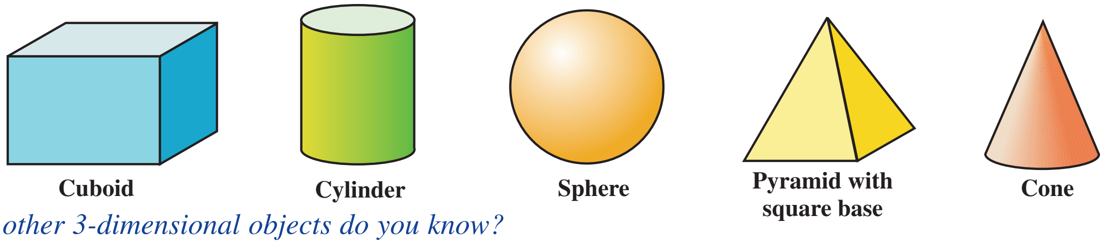
6. Daniel has a part-time job in a factory. He is paid £36 for each shift he works.
Last year he worked 108 shifts.
Calculate Daniel's total pay for the year. Give your answer to the nearest £100.

7. The floor of a lounge is a rectangle which measures 5.23 m by 3.62 m.
The floor is to be carpeted.
(a) Calculate the area of carpet needed.
Give your answer to an appropriate degree of accuracy.
(b) Explain why you chose this degree of accuracy.

8. Flour costs 79p per kilogram from the flour mill.
Rachel bought 300 kg of flour from the mill.
She shared the flour equally between 18 people.
How much should each person pay?

16 Volumes of Solids

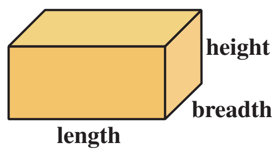
These are all examples of 3-dimensional objects or solids.



What other 3-dimensional objects do you know?

Volume

Volume is the amount of space occupied by a three-dimensional object.

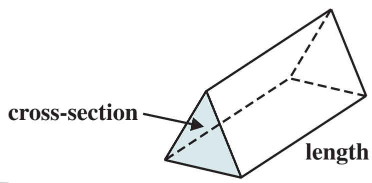


The formula for the volume of a **cuboid** is:
Volume $=$ length $\times$ breadth $\times$ height.
$V = l \times b \times h$

A **cube** is a special cuboid in which the length, breadth and height all have the same measurement.
Volume $=$ length $\times$ length $\times$ length.
$V = l^3$

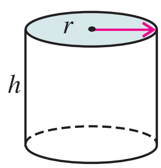
Volume of a prism

If you make a cut at right angles to the length of a prism you will always get the same cross-section.
Volume of a prism $=$ area of cross-section $\times$ length.



Volume of a cylinder

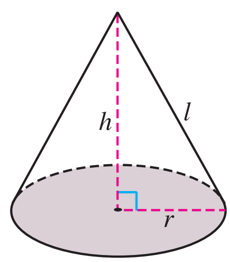
A **cylinder** is a prism.
The **volume of a cylinder** can be written as:
Volume $=$ area of cross-section $\times$ height
$V = \pi r^2 h$



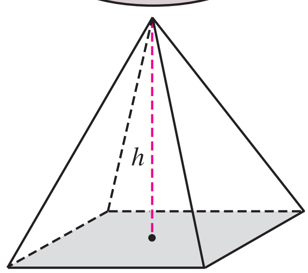
Notice that length has been replaced by height.

Cones, pyramids and spheres

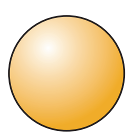
The diagram shows a cone with:
circular base, radius r, slant height l, perpendicular height h.
Using Pythagoras' Theorem, $l^2 = r^2 + h^2$.



Volume of a cone $= \frac{1}{3} \times$ base area $\times$ perpendicular height
The area of the circular base $= \pi r^2$.
$V = \frac{1}{3} \pi r^2 h$



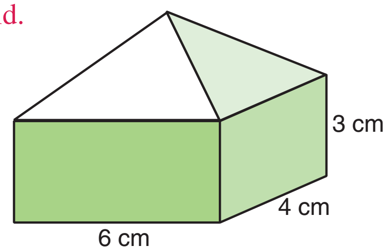
The volume of a pyramid is given by:
$V = \frac{1}{3} \times$ base area $\times$ perpendicular height



The volume of a sphere is given by:
$V = \frac{4}{3} \pi r^3$

Example 1

This model was formed by joining together a pyramid and a cuboid.
The total height of the model is 5.5 cm.
Find the total volume of the model.



Total volume = volume of pyramid + volume of cuboid.

Volume of pyramid $= \frac{1}{3} \times$ base area $\times$ perpendicular height.

The base of the pyramid is a rectangle measuring 6 cm by 4 cm.
The height of the pyramid = 5.5 cm − 3 cm = 2.5 cm.

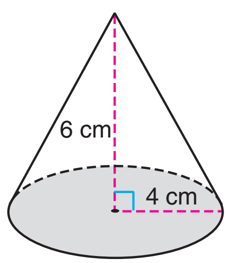
$$\begin{aligned} \text{Volume of pyramid} &= \tfrac{1}{3} \times 6 \times 4 \times 2.5 \\ &= 20\,\text{cm}^3 \\ \text{Volume of cuboid} &= lbh \\ &= 6 \times 4 \times 3 \\ &= 72\,\text{cm}^3 \\ \text{Total volume} &= 20 + 72 \\ &= 92\,\text{cm}^3 \end{aligned}$$

Practice Exercise 16.1

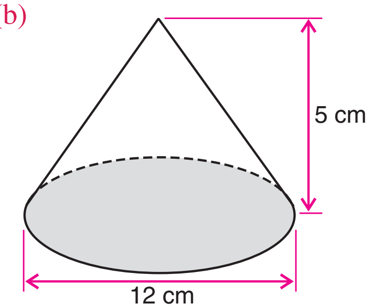
Use the π key on your calculator and give answers correct to 3 significant figures where appropriate.

1. Find the volumes of these solids.

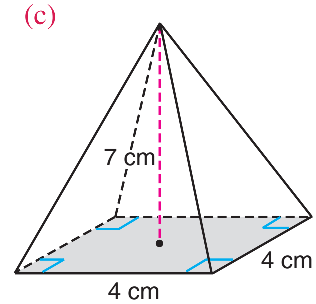
(a)



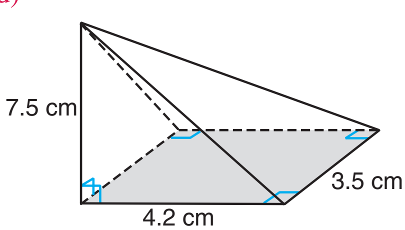
(b)



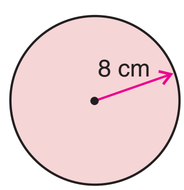
(c)



(d)

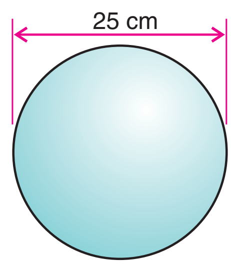


(e)



Sphere, radius 8 cm

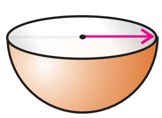
(f)



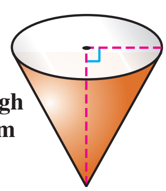
Sphere, diameter 25 cm

2. Which of these containers has the greater volume?
Show all your working.

A hemispherical bowl of radius 6 cm



A cone 15 cm high with radius 5 cm

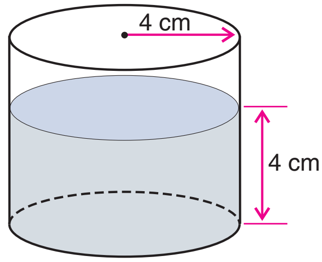


3. A pyramid with base area $20\,\text{cm}^2$ has volume $250\,\text{cm}^3$.
What is the height of the pyramid?

4. A metal cylinder is melted down and made into balls for a game.
The cylinder is 15 cm high and has radius 6 cm. The balls each have radius 1 cm.
How many balls can be made?

5. One hundred ball bearings with radius 5 mm are dropped into a cylindrical can, which is half full of oil. The height of the cylinder is 20 cm and the radius is 8 cm.
By how much does the level of the oil rise?

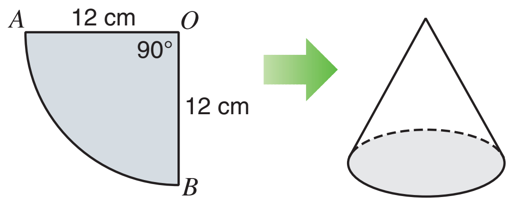
6. A cylinder of radius 4 cm contains water to a height of 4 cm.
A sphere of radius 3.6 cm is placed in the cylinder.
What is the increase in the depth of the water?



7. A cone is 6.4 cm high. It has a volume of 150 cm^3.
Calculate the radius of the cone.

8. A sphere has a volume of 58 cm^3.
Calculate the radius of the sphere.

9. A quadrant of a circle is cut out of paper.
A cone is made by joining the edges *OA* and *OB*, with no overlaps.
Calculate (a) the length of the arc *AB*,
(b) the base radius of the cone,
(c) the height of the cone,
(d) the volume of the cone.

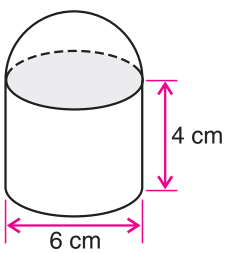


Practice Exercise 16.2

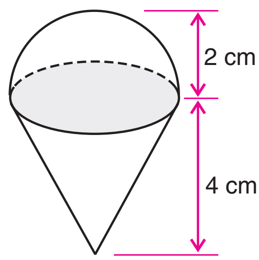
Use the π key on your calculator and give answers correct to 3 significant figures where appropriate.

1. Find the total volumes of these solids.

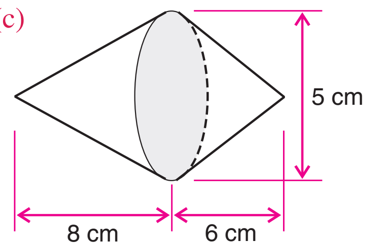
(a)



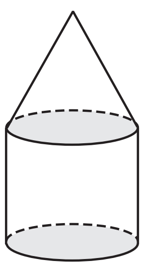
(b)



(c)

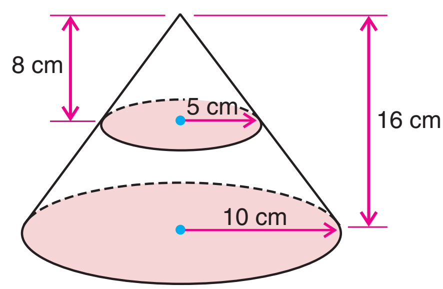


2.



A container is made by joining a cylinder and a cone.
The cylinder has a radius 15 cm and height 25 cm.
The cone has height 25 cm.
Calculate the volume of the container.

3. Rubber bungs are made by removing the tops of cones.
Starting with a cone of radius 10 cm and height 16 cm, a rubber bung is made by cutting a cone of radius 5 cm and height 8 cm from the top.
Find the volume of the rubber bung.



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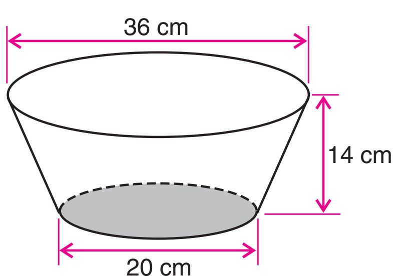
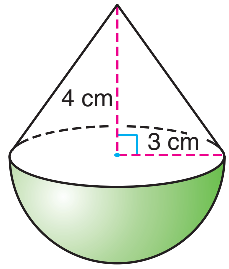


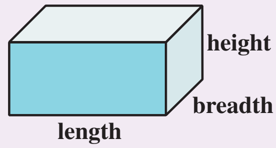
The dimensions of a steel bowl are shown.
Calculate the volume of the bowl.

5. A child's toy is made from a cone with base radius 3 cm and height 4 cm mounted on a hemisphere with radius 3 cm. Calculate the volume of the toy.

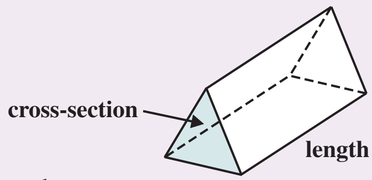


Key Points

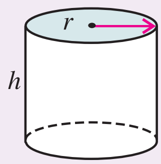
- **Volume** is the amount of space occupied by a 3-D object.
- The formula for the volume of a **cuboid** is:
  Volume = length × breadth × height
  $V = l \times b \times h$



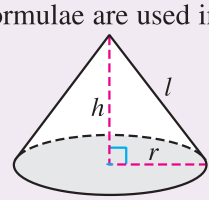
- Volume of a **cube** is: Volume = (length)^3
  $V = l^3$
- A prism is a 3-D object with the same cross-section throughout its length.



- Volume of a prism = area of cross-section × length
- A **cylinder** is a prism.
  Volume of a cylinder is: $V = \pi \times r^2 \times h$



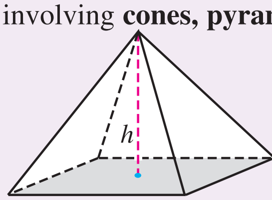
- These formulae are used in calculations involving **cones, pyramids,** and **spheres.**



Cone

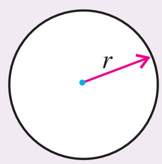
$V = \frac{1}{3} \times$ base area $\times$ height

$V = \frac{1}{3}\pi r^2 h$



Pyramid

$V = \frac{1}{3} \times$ base area $\times$ height



Sphere

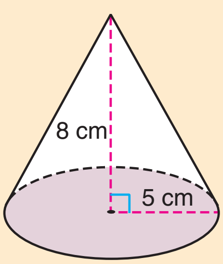
Volume $= \frac{4}{3}\pi r^3$

Review Exercise 16

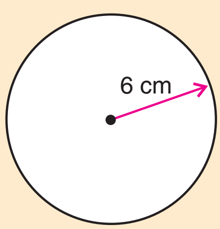
Use the π key on your calculator and give answers correct to 3 significant figures where appropriate.

1. Find the volumes of these solids.

(a)

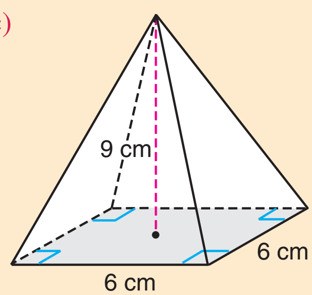


(b)



Sphere, radius 6 cm

(c)



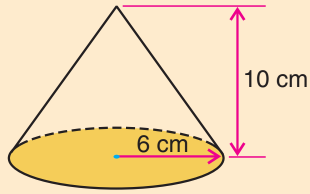
2. A projectile consists of a conical nose cap, length 1.2 m, diameter 48 cm; a cylindrical body, length 3 m, diameter 48 cm; and a hemispherical tail, diameter 48 cm. Find the volumes of the nose, the body and the tail, and, hence, find the total volume of the projectile.

3. A cone is 10 cm high and has a base radius of 6 cm.

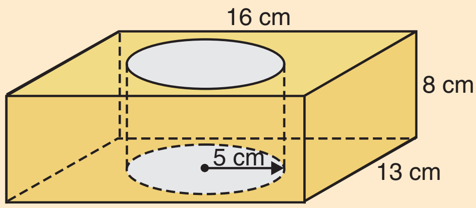
(a) Calculate the volume of the cone.

The top of the cone is cut off to leave a frustum 8 cm high.

(b) Calculate the volume of the frustum.

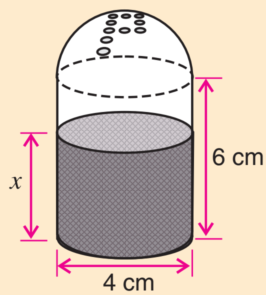


4.

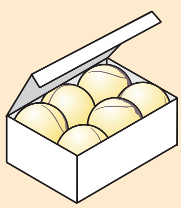


The diagram shows a block of wood.
The block is a cuboid measuring 8 cm by 13 cm by 16 cm.
A cylindrical hole of radius 5 cm is drilled through the block of wood.
Find the volume of wood remaining.

5. The diagram shows a pepper pot.
The pot consists of a cylinder and a hemisphere.
The cylinder has a diameter of 4 cm and a height of 6 cm.
The pepper takes up half the **total** volume of the pot.
Find the depth of pepper in the pot, marked x in the diagram.

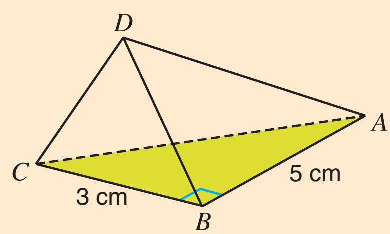


6.

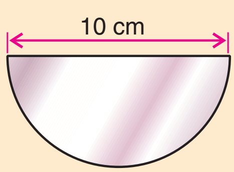


The diagram shows a cuboid which is just big enough to hold six tennis balls.
Each tennis ball has a diameter of 6.8 cm.
Calculate the volume of the cuboid.

7. The diagram shows a triangular pyramid.
Angle $ABC = 90°$, $AB = 5$ cm and $BC = 3$ cm.
The volume of the pyramid is 28 cm^3.
Calculate the height of the pyramid.

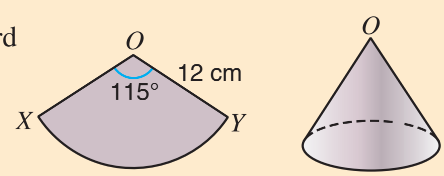


8.

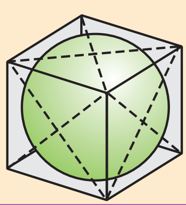


A cone is formed from a semicircular sheet of foil.
The foil has a diameter of 10 cm.
Find (a) the radius of the base of the cone,
(b) the volume of the cone.

9. A sector of a circle of radius 12 cm is cut out of card and used to create a cone by joining OX to OY, with no overlaps, as shown.
Calculate the volume of the cone.



10.



This diagram shows a sphere of radius 4.5 cm fitting tightly inside a box.
The box is a cube.
Calculate the volume of the space around the sphere, inside the cube.

Revision Exercise 2 Calculator Paper

You may use a calculator for this exercise.

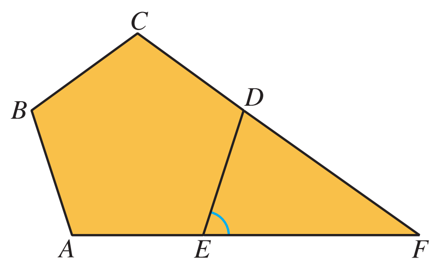
1. (a) Expand and simplify $\sqrt{2}(3\sqrt{2} - 2)$.
(b) Given that $150 = 5\sqrt{c}$, find the value of c.
(c) Expand the brackets and simplify $(2 - \sqrt{5})(3 + \sqrt{5})$.

2. (a) Write the following numbers in scientific notation.
(i) 140 000 000 (ii) 0.000 014
(b) Calculate $(3.2 \times 10^{-4}) \times (2.5 \times 10^{2})$.
Give your answer in scientific notation.
(c) Calculate $(5.2 \times 10^{-3}) \times (1.4 \times 10^{-2})$.
Give your answer as an ordinary number correct to two significant figures.

3. In a sale, all computers are sold with a discount of 35%.
Amanda pays £273 for a computer in the sale.
What was the price of the computer before the sale?

4. (a) Solve the equation $3p = -15$.
(b) Solve the inequation $-2p < 8$.
(c) Solve the equation $3(q - 4) = 12$.
(d) Solve the inequation $2p + 3(p - 4) \geqslant p - 13$.

5. *ABCDE* is a regular pentagon.
F is a point such that *CDF* and *AEF* are straight lines.
Calculate the size of:
(a) angle *DEF*,
(b) angle *CDE*,
(c) angle *DFE*.



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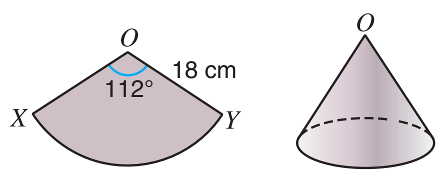


A sector of a circle, radius 18 cm, is cut out of card.
By joining *OX* to *OY*, a cone is formed.
(a) Calculate the length *XY*.
(b) Calculate the volume of the cone formed.

7. Find the value of v, if $v^3 = \frac{64P}{wA}$
when $P = 1230$, $w = 65.4$ and $A = 0.0108$.
Give your answer correct to 3 significant figures.

8. Trevor recorded his journey times, in minutes, to travel between home and school.

	Monday	Tuesday	Wednesday	Thursday	Friday
Home to school	35	37	37	38	35
School to home	38	31	41	43	36

(a) Find the mean and standard deviation of the times, in minutes, for Trevor's journeys from home to school.
(b) Find the mean and standard deviation of the times, in minutes, for Trevor's journeys from school to home.
(c) Compare the times it takes Trevor to travel to and from school.

Revision Exercise 3 Non-calculator Paper

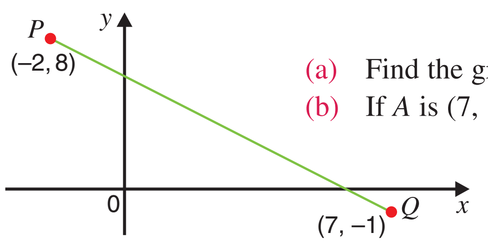
Do not use a calculator for this exercise.

1. (a) Write $0.000\,45$ in scientific notation.
(b) Write $984\,000$ in scientific notation.
(c) $1.2 \times 10^{a} \times b \times 10^{5} = 4.8 \times 10^{-2}$
Find the values of a and b.

2. (a) Find the value of:
(i) $25^{-\frac{1}{2}}$ (ii) $16^{\frac{3}{4}}$ (iii) $8^{\frac{2}{3}}$
(b) Simplify:
(i) $2a^3b^2 \times 3a^2b^3$ (ii) $\dfrac{12a^2b^4}{3ab^3}$ (iii) $\dfrac{2a^2b^3 \times 5ab}{2(ab^2)^2}$

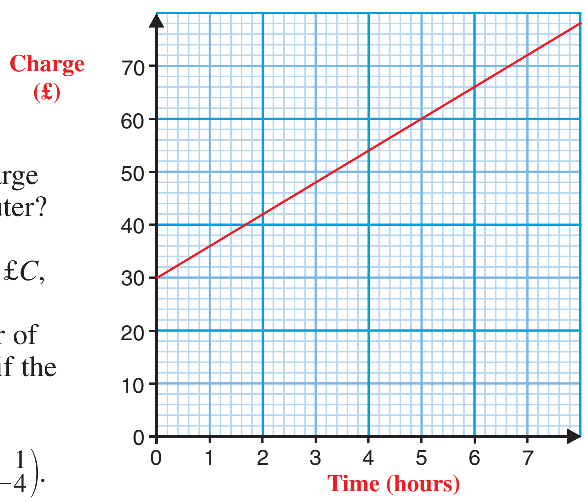
3. Work out.
(a) $\dfrac{x}{6} + \dfrac{2x}{3} - \dfrac{x}{2}$ (b) $\dfrac{2}{15x} + \dfrac{5}{12x}$ (c) $\dfrac{10x}{3} - \dfrac{2x}{9}$ (d) $\dfrac{2}{x} - \dfrac{3}{2x} + \dfrac{4}{3x}$

4.



(a) Find the gradient of the line PQ.
(b) If A is $(7, -2)$ and B is $(1, 22)$, find the gradient of AB.

5. A computer technician uses this graph to show his customers how much he charges for home visits to repair their computers.
The total charge is made up of a call-out fee plus an amount for the time taken to repair a computer.
(a) How much is the call-out charge?
(b) How much would the technician charge if he takes 3 hours to repair a computer?
(c) Find the gradient of the line.
(d) Write a formula for the total charge, £C, for repairing a computer in t hours.
(e) Use your formula to find the number of hours required to repair a computer if the total charge was £78.



6. $\overrightarrow{OA} = \begin{pmatrix} -3 \\ 1 \end{pmatrix}$, $\overrightarrow{OB} = \begin{pmatrix} 4 \\ 2 \end{pmatrix}$, and $\overrightarrow{OC} = \begin{pmatrix} 1 \\ -4 \end{pmatrix}$.
Write the following vectors in column form.
(a) $\overrightarrow{AB}$ (b) $\overrightarrow{BC}$ (c) $\overrightarrow{AC}$

7. (a) On the same diagram, sketch the graphs of $y = \sin x$ and $y = 4 \sin x$ for values of x from 0° to 360°.
(b) $\sin 30° = 0.5$.
Solve the equation $2 \sin x + 1 = 0$ for values of x between 0° and 360°.

8. The formula for finding the total surface area of a cylinder is $A = 2\pi r(r + h)$.
Rearrange $A = 2\pi r^2 + 2\pi rh$ to make h the subject of the formula.