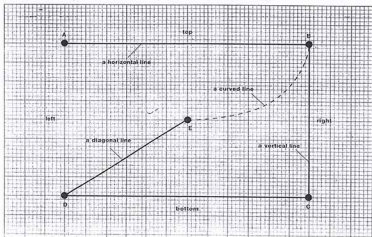


Section 1: Vocabulary

**A** Read the text and look at the diagram.

Geometry is a part of mathematics. It is the study of points and lines, surfaces and angles, and solid shapes. We look at points and lines in this unit, surfaces and angles in Unit 4 and solid shapes in Unit 5.

A point has **position**. For example, point A is **top left** of the diagram, and point C is **bottom right**. Point E is in the **centre**. We can also say that point A is **above** point D and point C is **below** point B.

A line has **direction**. For example, line AB goes **left to right**. We call a line like this **horizontal**.

Line BC goes **top to bottom**. We call a line like this **vertical**. Line DE goes **bottom left to centre**. We call a line like this **diagonal**.

The shortest line between two points is **straight**. All the **solid** lines in the diagram are straight lines. However, we can also join two points with a **curved** line. The **dotted** line ED is curved.

When two straight lines have the same direction but do not meet, we call them **parallel**. DC is parallel to AB .

A line also has **length**. It can be long, or short, or medium length.

B Study the Grammar Box.

Talking about new topics

We use **There is** and **There are** to introduce a new topic.

We use **It is** and **They are** to give more information about an 'old' topic.

Examples:

There is a set of numbers. It is called 'computer readable.'

There are seven straight lines. They are arranged like the number 8.

C Look at the numbers. Complete each sentence with a suitable word.

There is _____ diagonal line in the number 7. It _____ from the top right to the bottom left. _____ is also a horizontal line.

_____ is at the top. There aren't _____ curved lines.

There _____ three straight lines in the number 4. _____ is a vertical line. _____ meets a diagonal line _____ the top.

There is _____ horizontal line. It meets _____ diagonal line _____ the left and crosses _____ vertical line.

a, is
there
it, any
are, there
it, at
a, the
on, the
(b3)

Section 3: Listening

1 A Listen and complete the summary of the reading text in Section 2. Write one word in each space.

The screen of a pocket calculator has to show all the Arabic _____ 0 to 9. It does this with just seven _____. The lines are arranged like the number 8 and they are all the same _____. There are two _____ lines on the left and two on the right. There is one _____ line across the top, one across the bottom and one across the centre.

ABCDE
FGHIJK
LMNOP
QRSTU
WXYZ

2 B Listen and choose the best answer in each case.

- This listening text is about:
 - designing cell phones.
 - displaying letters on calculators.
 - writing the English alphabet.
 - displaying numbers on calculators.
- How many capital letters can you make with the pocket calculator system?
 - 6
 - 16
 - 26
 - 60
- The calculator system can't make the other capital letters because there aren't any:
 - diagonal lines.
 - vertical lines.
 - horizontal lines.
 - curved lines.



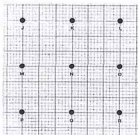
- B** Look at the signs on the right. Complete the description. Use the words in the box.

1 above 2 below 3 curved 4 diagonal 5 horizontal 6 left 7 parallel 8 top 9 vertical

—
+
÷
×
(or)
=

- 5 1 There is a short _____ line.
 9 2 There is a short horizontal line crossed by a short _____ line.
 1 2 3 There is a short horizontal line and one point _____ the centre and one point _____ the centre.
 4 4 There is a _____ line from top left to bottom right crossed by another diagonal line from _____ right to bottom _____.
 8, 6 5 There is a vertical _____ line.
 3 6 There is a short horizontal line. There is another short horizontal line above and _____ to it.
 7

- C** Where is each point in the panel? Write the letter next to the correct word or phrase.



1	top centre	K
2	centre left	M
3	centre right	O
4	bottom centre	Q
5	centre	N
6	above O	L
7	below M	P
8	top left	J
9	bottom right	R

Section 2: Reading

b, b, b, c.

- A** Read the text opposite. Choose the best answer in each case.

- 1 In Figure 1, number 7 has a short horizontal line and:
 a a long horizontal line.
 b a long diagonal line.
 c a short vertical line.
 d a long curved line.
- 2 In Figure 1, how many numbers have a curved line?
 a six
 b seven
 c eight
 d nine
- 3 The numbers in Figure 2:
 a have no straight lines.
 b have no curved lines.
 c have no thick and thin lines.
 d have no black and white lines.
- 4 How can you make the number 7 on the screen of a calculator?
 a BD + DF
 b AB + BD + CD + CE
 c AB + BD + DF
 d AB + BD

Displaying Numbers

WHEN SCIENTISTS DESIGNED THE first pocket calculator, they needed a simple way to show the Arabic numerals 0 to 9 on the screen. They wanted to use straight horizontal and vertical lines of the same length. Is there a way? Handwrite the numbers (Figure 1) and the answer seems to be No. There are straight vertical lines in number 1 and number 4, and straight horizontal lines in numbers 2, 4, 5 and 7. But there are other lines too. There are diagonal lines in number 4 and number 7, and curved lines in all the other numbers except number 1. In addition, the lines are different lengths.

However, we can write the numbers in a simpler way. For example, there is a set of numbers used by computer systems in some banks. It is called 'computer readable' (Figure 2). In this system, the computer actually reads the numbers, on cheques for example, so the number must be exactly the same each time. But, look closely at this set of numbers and you will see that the system is still quite complicated. Some of the lines are thick and some are thin. There are two positions for the short horizontal line in the centre (in 3 and 4) and the horizontal line in the centre of 2 is shorter than the centre line in 6.

Then scientists found the answer. Turn on your calculator. Look closely at the screen. There are only seven lines. They are arranged like the number 8 (Figure 3). They are all the same length. However, with these seven lines, we can make all the numbers from 0 to 9. The computer program in the calculator tells the screen which lines to light up to make each number. So the computer instruction for number 1 is $BD + DF$, and for number 5, it is $AB + AC + CD + DF + EF$.



Figure 1



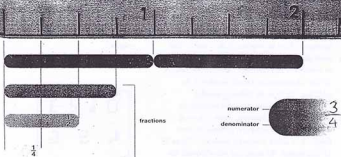
Figure 2



Figure 3

Section 1: Vocabulary

Ruler

**A** Read the text and look at the diagram.

In most technical subjects, like engineering, mathematics is very important. Mathematics is the study of numbers and spaces. In this unit we look at numbers. We will look at spaces in Unit 5.

- 5 There are two main kinds of numbers – **whole numbers** and **fractions**. Whole numbers are numbers like 1, 2, 3. We can also write whole numbers as **decimals**; for example, 1.0, 2.0, 3.0. Fractions are numbers between whole numbers; for example, the numbers between 1 and 2. We can express them as **common fractions**. With common fractions, we have a number, then a line, then another number, like $\frac{1}{4}$ (a quarter), $\frac{1}{2}$ (a half), $\frac{3}{4}$ (three-quarters). The number below the line is called the **denominator**. It shows how many pieces we are dividing the whole number

into. The number above the line is called the **numerator**. It shows how many pieces of the denominator we have taken.

We can also express fractions as decimals. Decimals are based on the idea that any whole number can be divided into 100 parts. So $\frac{1}{2}$ is 50 of these parts. We write it as 0.50 and say *nought point five* or *nought point five zero*. Note that we do not say, for example, *fifty* after a decimal point.

Fractions can also be expressed as **percentages**. Like decimals, percentages are also based on 100 but in this case we say $\frac{1}{2}$ is the same as 50 out of 100, or 50 per cent. If you look closely, the % symbol for percentage looks like 100, written in a strange way.

الترتيب

Cardinals

and

الترتيب

Ordinals

How do you say these numbers: 10, 11?

**What about when they are part of a date:
10/11/2005?**

In the first case we say *ten, eleven*, but in the second case we
5 say the date as *November the tenth* because we are thinking of
the days in order. When we put things in order, we use
special number words in English called 'ordinals'.

Most ordinals are almost the same words as the cardinal
numbers. We just add *th* to the cardinal number to make the
10 ordinal. For example, *four* becomes *fourth*, *six* becomes *sixth*.
However, there are a few spelling changes. Be careful with
five, which becomes *fifth*. Don't forget that *eight* only has
one *t* in the ordinal form (*eighth*). *Nine* loses an *e* (*ninth*).
Remember also that numbers ending in *y* lose the *y* and
15 add *ieth* (*twenty* — *twentieth*).

When we write the date in British English, we don't always
use a special symbol. So we write, for example, *10 November*.
But in mathematics there is a special symbol for an ordinal
number. We use the extra *th*; for example, *5th*. In printing,
20 *th* is often written as two very small letters above the line;
for example, *5th*.

Be careful with the first three ordinal numbers. They are
different words from the cardinals. *One, two, three* become
first, second, third. Like other ordinal numbers, we use the last
25 two letters of the ordinal words in the symbols, so we get
1st, 2nd and *3rd* or, in printing, *1st, 2nd* and *3rd*.

B Look at the table. Test each other in pairs.

Common fractions	Decimal fractions	Percentages	Words
$\frac{1}{4}$	0.25	25%	a quarter
$\frac{1}{2}$	0.50	50%	a half
$\frac{1}{3}$	0.333	33.3%	a third
$\frac{3}{4}$	0.75	75%	three-quarters
$\frac{2}{3}$	0.666	66.7%	two-thirds
$\frac{1}{5}$	0.20	20%	a fifth
$\frac{1}{10}$	0.10	10%	a tenth
$\frac{2}{5}$	0.40	40%	two-fifths
$\frac{1}{20}$	0.05	5%	a twentieth

C Complete each sentence with a suitable word or number.

- The symbol $\frac{1}{4}$ is a common _____.
- 0.25 is a _____ fraction.
- The symbol % means _____.
- In the fraction $\frac{1}{4}$, the number _____ is the numerator.
- In the fraction $\frac{1}{4}$, the number _____ is the denominator.
- The word for the fraction $\frac{1}{4}$ is a _____.
- The common fraction $\frac{1}{5}$ is the same as _____ %.
- The decimal fraction 0.10 is the same as the common fraction _____.

fraction
decimal
percent
one
four
third
20
 $\frac{1}{10}$

Section 2: Reading

b - b - d - b

A Read the text opposite. Choose the best answer in each case.

- In British English we can say the date 10/11 as:
- tenth of eleventh.
 - November the tenth.
 - the ten of the eleven.
 - tenth of eleven.
- 2 Numbers like *fourth*, *fifth* and *sixth* are called:
- simple numbers.
 - ordinals.
 - cardinals.
 - ordinary.
- 3 To change *thirty* into an ordinal number:
- add *th*.
 - remove the *y* and add *th*.
 - remove the *y* and add *ith*.
 - remove the *y* and add *ieith*.
- 4 The symbol for ordinals uses:
- the last letter of the ordinal word.
 - the last two letters of the ordinal word.
 - the first letter of the ordinal word.
 - the first and last letter of the ordinal word.

B Study the table.

Cardinal numbers		Ordinal numbers	
symbol	word	symbol	word
1	one	1 st	first
2	two	2 nd	second
3	three	3 rd	third
4	four	4 th	fourth
5	five	5 th	fifth
6	six	6 th	sixth
7	seven	7 th	seventh
8	eight	8 th	eighth
9	nine	9 th	ninth
10	ten	10 th	tenth
11	eleven	11 th	eleventh
12	twelve	12 th	twelfth
20	twenty	20 th	twentieth
21	twenty-one	21 st	twenty-first
22	twenty-two	22 nd	twenty-second
30	thirty	30 th	thirtieth

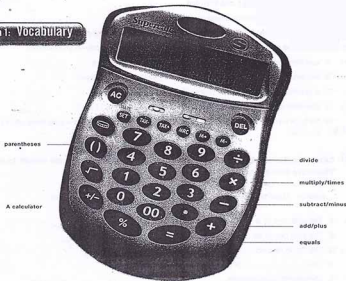
- Cover each column in turn. Try to remember the information in that column.
- Work in pairs. Dictate cardinal and ordinal numbers.
- Write an ordinal number for each of these cardinal numbers.

- a twenty-three 23rd
- b thirty-one 31st
- c forty-two 42nd
- d fifty-three 53rd
- e sixty 60th

- Write these numbers in words.

- a 41st forty-first
- b 2nd second
- c 70th seventieth
- d 32 thirty-two
- e 77 seventy-seven

Section 1: Vocabulary



A Read the text and look at the picture.

Arithmetic is a part of mathematics. It involves four basic **operations**, +, -, ×, ÷. We call these operations in English, **addition** (+), **subtraction** (-), **multiplication** (×), **division** (÷). Each arithmetic operation has a **result**. We show the result after the **equals** sign (=).

We use arithmetic, so we can:

- **add** one number to [and] another number; for example, $2 + 2 = 4$
- **subtract** one number from another number; for example, $4 - 2 = 2$
- **multiply** one number by another number; for example, $2 \times 3 = 6$
- **divide** one number by another number; for example, $6 \div 3 = 2$

However, when we talk about the first three operations, we don't normally use the verbs

add, subtract and multiply. We say **plus, minus and times** instead. So we describe the first three operations above as:

- *two plus two equals four*
- *four minus two equals two*
- *two times three equals six*

With division, we sometimes turn the **sum** around and use **into**. So we say: *three into six equals two*.

In a long sum, we do the calculations in order from left to right. So $3 \times 8 - 7$ is the same as $3 \times 8 = 24$ then $- 7 = 17$. If you want addition or subtraction to happen first, put that part of the sum inside **brackets** (). So $3 \times (8 - 7)$ is the same as $8 - 7 = 1$, then $\times 3 = 3$. Remember this rule as **brackets over division, multiplication, addition, subtraction or BODMAS**.

B Write each sum in numbers and arithmetic signs.

- $5 \times 2 = 10$ 1 five times two equals ten
 $15 \div 3 = 5$ 2 fifteen divided by three equals five
 $21 + 14 = 35$ 3 twenty-one plus fourteen equals thirty-five
 $6524 - 1993 = 4531$ 4 six thousand and twenty-four minus one thousand three hundred and seventy-nine equals four thousand six hundred and forty-five
 $3 \times 8 = 24$ 5 three times eight equals twenty-four
 $3 \times (8 - 7) = 3$ 6 three times open brackets eight minus seven close brackets equals three
 $95.6 - 27.1 = 68.5$ 7 ninety-five point six minus twenty-seven point one equals sixty-eight point five
 $144 \div 6 = 24$ 8 one hundred and forty-four divided by six equals twenty-four
 $10 \times 10 \times 1000 = 100000$ 9 ten times ten times one thousand equals one hundred thousand
 $\frac{1}{4} + \frac{1}{2} = \frac{3}{4}$ 10 a quarter plus a half equals three-quarters
 $\frac{1}{3} - \frac{1}{6} - \frac{1}{6} = \frac{1}{6}$ 11 one-third minus one-sixth minus one-sixth equals one-sixth
 $33.754 - 2.8123 = 30.9417$ 12 thirty-nine point seven five four minus nought point eight one two equals thirty-eight point nine four two

C Complete the sentences about the sums in Exercise B. Use the words in the box. There are two extra words.

addition decimals division fraction multiplication result subtraction

- multiplication 1 The ninth one is a _____ sum.
 addition 2 The third one is an _____ sum.
 subtraction 3 The fourth one is a _____ sum.
 result 4 The _____ of the fifth one is seventeen.
 decimals 5 The seventh one involves _____.

D Say the sums below. Use words from the table.

Sign	+	-	x	÷	=
operation	add	subtract	multiply	divide	equals
other words	plus, and	from, minus, take away	times	into	comes to, is

- | | |
|------------------------------|-----------------------------------|
| 1 $10 \div 2 = 5$ | 5 $1974 - 29 = 1945$ |
| 2 $5 \times 3 = 15$ | 6 $\frac{1}{2} + \frac{1}{2} = 1$ |
| 3 $4 \times (8 \div 2) = 16$ | 7 $40 - 31 = 9$ |
| 4 $65.8 + 21.7 = 87.5$ | 8 $7,426 - 1,235 = 6,191$ |

- | | |
|--|---|
| ① ten divide by two equals five.
* two into ten equals five. | ⑤ one thousand nine hundred and seventy four minus
twenty nine equals one thousand nine hundred and forty five. |
| ② * five times three equals fifteen
* five multiplied by three equals fifteen | ⑥ one hundred and ninety five divided by five equals thirty nine. |
| ③ four times open brackets eight divided
by two close brackets equals sixteen | ⑦ forty nine times thirty one equals nine. |
| ④ sixty five plus eight (plus added to) twenty one
point seven equals eighty seven point five | * thirty one subtracted from forty equals nine. |
| | ⑧ seven thousand four hundred and twenty six minus
one thousand two hundred and thirty equals six thousand one hundred and ninety one. |

A Read the text opposite. Choose the best answer in each case.

- 1 This text comes from:
a a dictionary.
b an instruction leaflet.
c an encyclopedia.
d a website.
- 2 Use the AC/ON key to:
a turn on Supercalc.
b show the result.
c clear the screen.
d turn on Supercalc and clear the screen.
- 3 Use the DEL key to:
a clear the screen.
b remove the last sign.
c remove the last number.
d remove the last sign or number.
- 4 To add 26.7 and 43.5, press:
a eight keys.
b nine keys.
c 10 keys.
d 11 keys.
- 5 Choose the correct set of keys to calculate a percentage on this calculator.
a first number, second number, %
b first number, divide, second number, equals, %
c first number, divide, second number, %
d first number, divide, second number, %, equals

B Study the Grammar Box.

Giving instructions

We use the **imperative** to give instructions.

Example:

Do a calculation.

Press the delete key.

We make the negative with **Don't + Imperative**.

Example:

Don't clear the screen.

C Complete these instructions with a word from the box in each space. You can use the same word more than once.

clear do press recall store use don't then

How to use Supercalc Plus!

_____ long calculations with Supercalc Plus. _____ and _____ numbers, then _____ them in new calculations.

For example: You want to calculate $2 / (7 - 4)$

_____ the 7 key, then the minus key, then 4,

_____ press =. The result (3) appears automatically.

_____ the number in memory. _____ the MS (memory store) key.

_____ the screen. _____ the AC (account clear) key.

_____ the 2 key, then the divide key. Then _____ the last result.

_____ the MR (memory recall) key. _____ press any key. You will see the result: 0.667.

Section 3: Listening

- A Listen and complete the summary of the reading text in Section 2. Write one word in each space.**

With Supercalc you can add, subtract, multiply and _____ in a moment. Turn on Supercalc with the AC/ON _____. Also press this key before you do a _____ to clear the screen (AC = _____ clear). If you make a mistake, press the _____ key. This removes the last number or _____.

- B Listen to the conversation and choose the best answer in each case.**

- 1 What kind of calculation does the man want to do?
 a addition
 b division
 c multiplication
 d percentage
- 2 What result does the man get when he does the calculation?
 a 50%
 b 8%
 c 0.5
 d 4
- 3 What is the correct result of the man's calculation?
 a 1%
 b 1
 c 50%
 d 0.32

play + s → plays حروف ال ي
 country + s → countries
 * اذا كان تبادلا لمرادف يفتح ال كما هو ونضيف s
 * اذا كان قبل ال حروف ما تفتح ال ونضيف /
 city + s → cities
 boy + s → boys
 * اي صفة نضيف لها full تفتح ال واما
 wander + full → wonderful
 use + full → use full
 مصاعفة الحروف الصامتة :
 اذا كانت الكلمة تالفة من مقطع واحد وسبق
 الحرف ال ف نضيف وارتنا اضافة لصفة
 تبادلا لمرادف /er, est /
 wet + est → wettest
 fast + est → fastest
 big + er → bigger

قاعدة الجمع :
 pens → pens
 churches → churches
 * ال المتكلمة تتكلم بأحد الحروف ال (s, x, z, h, ch, sh)
 * نجمعها بإضافة s
 boxes → boxes
 vidios → vidies
 * اذا انتهت الكلمة بـ (f, fe)
 عند الجمع نزيله ونضيف /ves/
 wives → wives
 wolfs → wolves
 * الكلمات الالية عند الجمع نضيف s
 (potato - kilo - photo - radio - disco)
 * بعض الحروف المتكلمة :
 man → men
 woman → women
 child → children
 person → people
 foot → feet
 tooth → teeth
 mouse → mice

HAM

Section 1: Vocabulary



Figure 1: One-dimensional (1D) shapes

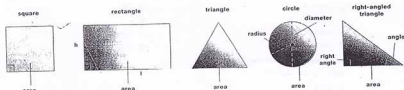


Figure 2: Two-dimensional (2D) shapes

A Read the text and look at the diagrams.

A line has only one dimension: length (l). For example, in Figure 1 the line from point A to point B has a length of 4 centimetres (cm). An arc is also a one-dimensional shape. It is a curved line between two points.

Some shapes have two dimensions: length and height (h). Squares, rectangles, triangles and circles are two-dimensional shapes. The length around most shapes is called the perimeter but the length around a circle is called the circumference. The width (w) of a circle is the diameter. The length from the centre to the edge of the circle is called the radius (r).

The space between two connected lines is an angle. Squares and rectangles have four angles of 90 degrees. The sign for 'degrees' is a small ° above the line. Some triangles have a 90° angle.

These are called right-angled triangles. The sign for a right angle in a triangle is a small square. The sign for any other angle is a curved line.

Two-dimensional shapes have area. The formula for the area of a rectangle is length \times height. For example, a rectangle 4 cm \times 3 cm has an area of 12 square centimetres (cm²). The formula for the area of a triangle is $\frac{1}{2} \times$ length (or base) \times vertical height. For example, a triangle with base 4 cm and vertical height 3 cm has an area $\frac{1}{2} \times 4 \times 3 = 6$ cm².

The formula for the area of a circle is πr^2 , where π , pronounced pi, is a constant – roughly 3.142. The area of a circle of radius 4 cm is $3.142 \times 4^2 = 50.272$ cm². We use π to calculate the length of the circumference too. The formula is $2\pi r$. So the circumference of the same circle of radius 4 cm is $2 \times 3.142 \times 4 = 25.136$ cm.

B Look at Figure 3. Answer the questions.

- 1 What is ABCD?
- 2 What is BCD?
- 3 How many circles are there?
- 4 How many squares are there?
- 5 How many rectangles are there?
- 6 How many right-angled triangles are there?
- 7 How many other triangles are there?
- 8 What size is angle AFB?
- 9 What size is angle BFE?
- 10 What is the curved line from A to B called?



Figure 3

C Look at the five shapes in Figure 4.

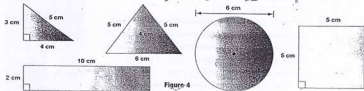


Figure 4

- 1 Match each item to the correct area.

12 cm² 20 cm² 25 cm²
28.3 cm² 6 cm²

- 2 Match each item to the correct length.

18.9 cm 20 cm 12 cm 16 cm 24 cm

25 cm² a The square is _____

20 cm² b The rectangle is _____

6 cm² c The right-angled triangle is _____

12 cm² d The other triangle is _____

28.3 cm² e The circle is _____

12 cm a The perimeter of the right-angled triangle is _____

16 cm b The perimeter of the other triangle is _____

24 cm c The perimeter of the rectangle is _____

20 cm d The perimeter of the square is _____

18.9 cm e The circumference of the circle is _____

Section 2: Reading

A Read the text opposite. Choose the best answer in each case.

- 1 What is the area of a triangle with a base of 16 cm and a height of 9 cm?
 - a 8 cm²
 - b 17 cm
 - c 17 cm²
 - d 72 cm²
- 2 Which kind of triangle has no equal angles?
 - a equilateral
 - b isosceles
 - c scalene
 - d right-angled
- 3 What is each angle in an equilateral triangle?
 - a 30°
 - b 60°
 - c 90°
 - d 180°
- 4 In the right-angled triangle in Figure 1, the hypotenuse is:
 - a the horizontal line.
 - b the vertical line.
 - c the diagonal line.
 - d the right angle.

B Study the Grammar Box.

Using which or that

We use *which* or *that* to introduce extra information about something.

Examples:

An equilateral triangle has three sides *which* are the same length.

Trigonometry is the branch of geometry *that* only deals with right-angled triangles.

C Find and correct the mistake in each sentence.

- 1 An isosceles triangle has two sides are equal. ~~are~~ → *that, which*
- 2 An isosceles triangle has two angles which is equal. ~~is~~ → *which, that*
- 3 One kind of triangle is the scalene triangle who has no equal sides or angles. ~~who~~ → *is*
- 4 There is an important theorem in trigonometry which named after a Greek mathematician. ~~which~~ → *is*
- 5 There is an important constant in geometry which it is called pi. ~~which~~ → *is*
- 6 A square is a rectangle has four equal sides and four right angles. ~~has~~ → *which-that*
- 7 A rectangle has two pairs of lines which they are parallel. ~~which~~ → *add*
- 8 A triangle has three angles which adds up to 180°. ~~adds~~ → *add*

Section 3: Listening

A Listen and complete this summary of the reading text from Section 2.

There are four kinds of _____: equilateral, isosceles, scalene and right-_____.
However, for all triangles, the internal _____ add up to 180° and the area is half the base times the _____. Pythagoras developed a theorem for right-angled triangles which states: the square on the _____ is equal to the sum of the squares on the other two sides.

B Listen to the conversation. The man doesn't understand two expressions in mathematics. Circle the two expressions.

addition	multiplication	subtraction
division	square root	geometry
formula	squared	trigonometry

C Listen again and complete the summary. Write one word, letter or number in each space.

When you see a small _____ written above the line after a letter or _____ it means 'squared'. For example, A^2 means 'A _____'. In other words, you must _____ A by itself. So if A is 2, A squared is _____. The opposite of squared is the square _____. The sign for this looks like a tick with a line _____ the letter or number. So \sqrt{A} means the square root of _____ if A is 16, the square root is _____.