THIS IS A NEW SPECIFICATION

OCR
RECOGNISING ACHIEVEMENT

**F**

# Monday 11 June 2012 – Afternoon

## GCSE APPLICATIONS OF MATHEMATICS

**A381/01** Applications of Mathematics 1 (Foundation Tier)

*A317030612*

Candidates answer on the Question Paper.

**OCR supplied materials:**
None

**Other materials required:**
- Scientific or graphical calculator
- Geometrical instruments
- Tracing paper (optional)

**Duration:** 1 hour

*A381 01*

| Candidate forename | | Candidate surname | |
|---|---|---|---|

| Centre number | | | | | | Candidate number | | | | |
|---|---|---|---|---|---|---|---|---|---|---|

**INSTRUCTIONS TO CANDIDATES**

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Your answers should be supported with appropriate working. Marks may be given for a correct method even if the answer is incorrect.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

**INFORMATION FOR CANDIDATES**

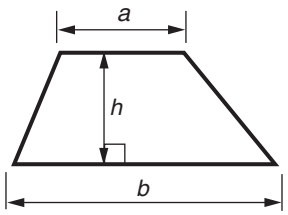
- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- Your Quality of Written Communication is assessed in questions marked with an asterisk (*).
- The total number of marks for this paper is **60**.
- This document consists of **20** pages. Any blank pages are indicated.

**You are permitted to use a calculator for this paper**

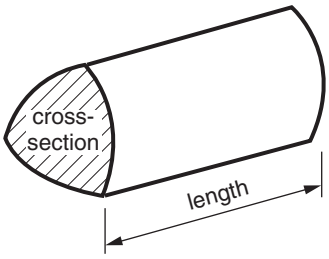
This paper has been pre modified for carrier language

## Formulae Sheet: Foundation Tier

**Area of trapezium** = $\frac{1}{2}(a + b)h$



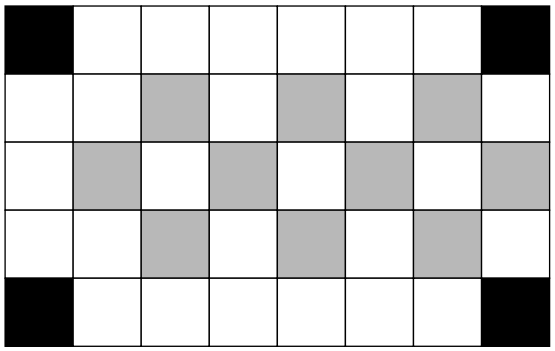

**Volume of prism** = (area of cross-section) × length

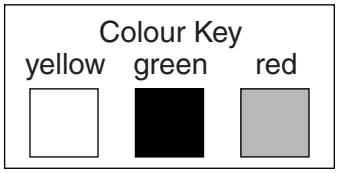



**PLEASE DO NOT WRITE ON THIS PAGE**

**1** Sanjay is making a blanket for his sister's baby.
The blanket is made from knitted squares.

Sanjay sketches the blanket and the pattern of squares.





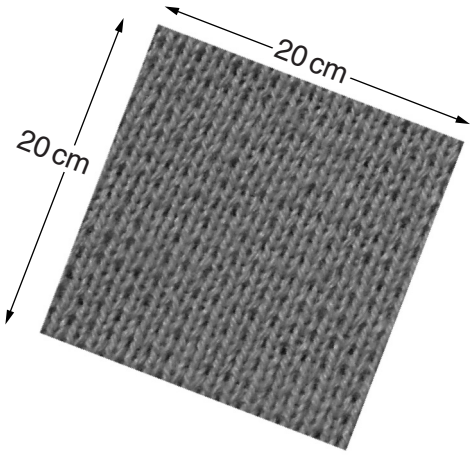

**(a)** How many squares does Sanjay need to knit?

**(a)** _____ **[1]**

**(b)** What fraction of the blanket will be green?

**(b)** _____ **[1]**

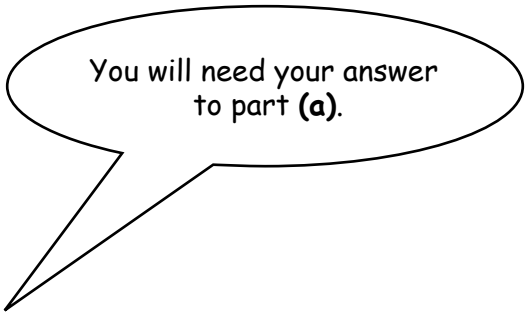
**(c)** Each square measures 20 cm by 20 cm.




What is the area of each square?

**(c)** _____ $cm^2$ **[1]**

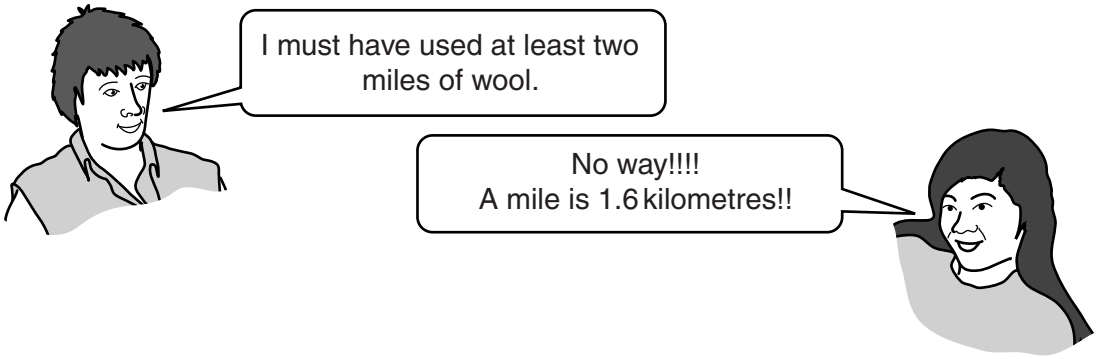
Sanjay uses this wool to make the blanket.
Each square needs 25 grams of wool.


**(d)** How many balls of wool will Sanjay need?

**(d)** _____ balls **[2]**

**(e)*** Sanjay finishes the blanket in time for the baby's birth.




Is Sanjay right?
Show clearly how you decided.

_____

_____

_____

_____

_____

_____

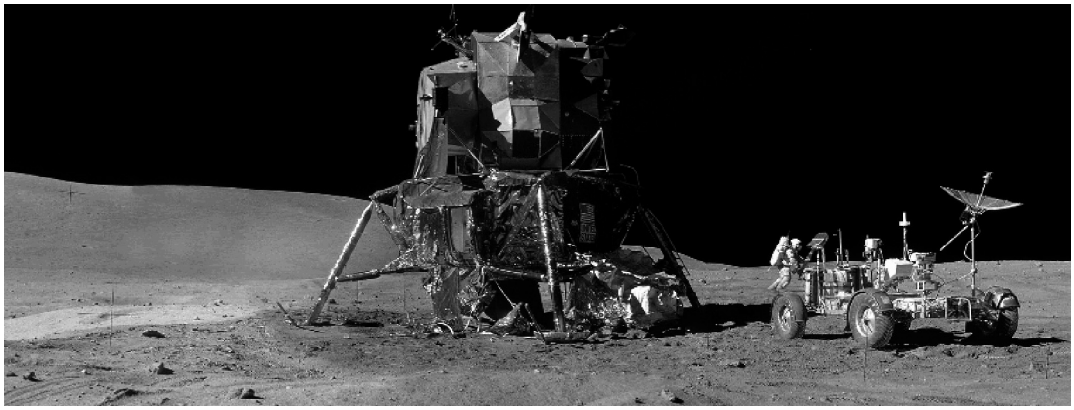
_____

_____

_____

_____ **[4]**

**2** Astronauts used a moon buggy to explore the moon.



**(a)** Each moon buggy costs $\$10^7$ to build!

**(i)** Write $10^7$ as an ordinary number.

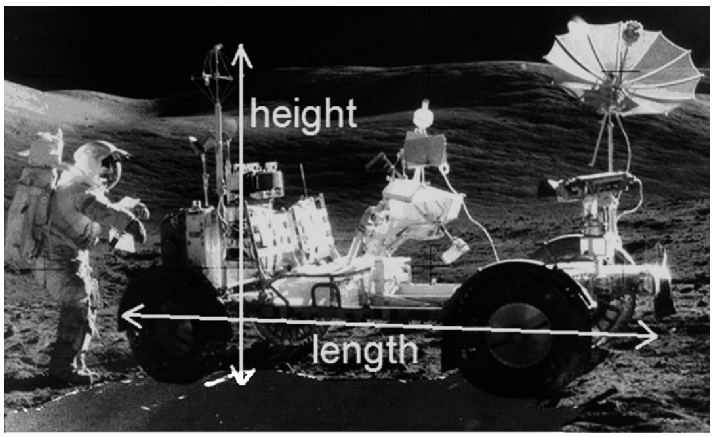
**(a)(i)** _____ **[1]**

**(ii)** Write your answer to part **(a)(i)** in words.

**(ii)** _____ **[1]**

**(b)** An astronaut is standing next to the moon buggy.

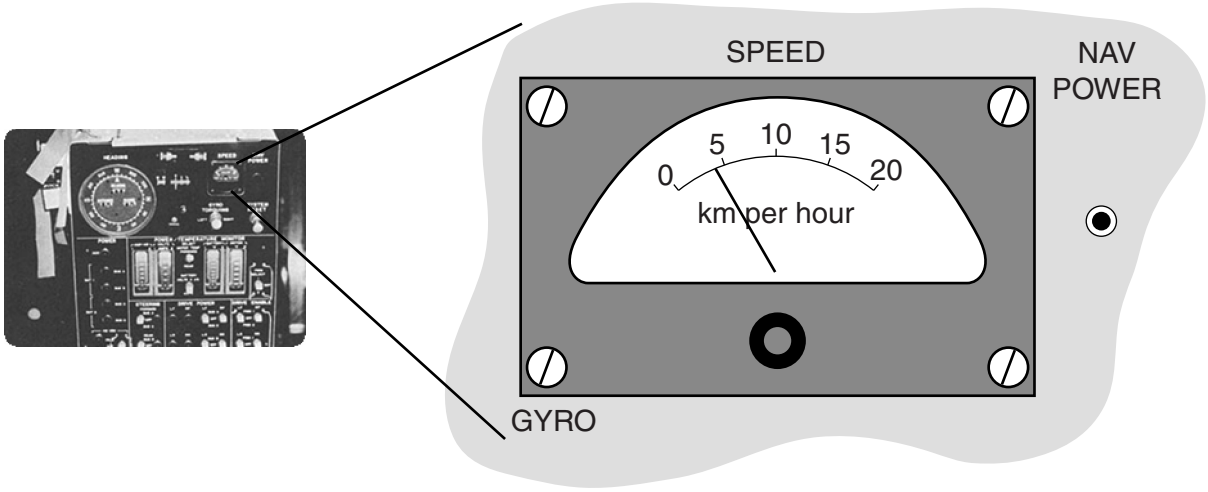
Estimate the height and length of this moon buggy.




Height _____ m **[1]**

Length _____ m **[1]**

**(c)** Estimate the speed shown on this moon buggy's controls.




**(c)** _____ km per hour **[1]**

**(d)** The average speed of a moon buggy is 8 km per hour.

How many minutes does it take a moon buggy to travel 4 km at this speed?

**(d)** _____ minutes **[1]**

**(e)** On the moon objects weigh $\frac{1}{6}$ of what they weigh on Earth.

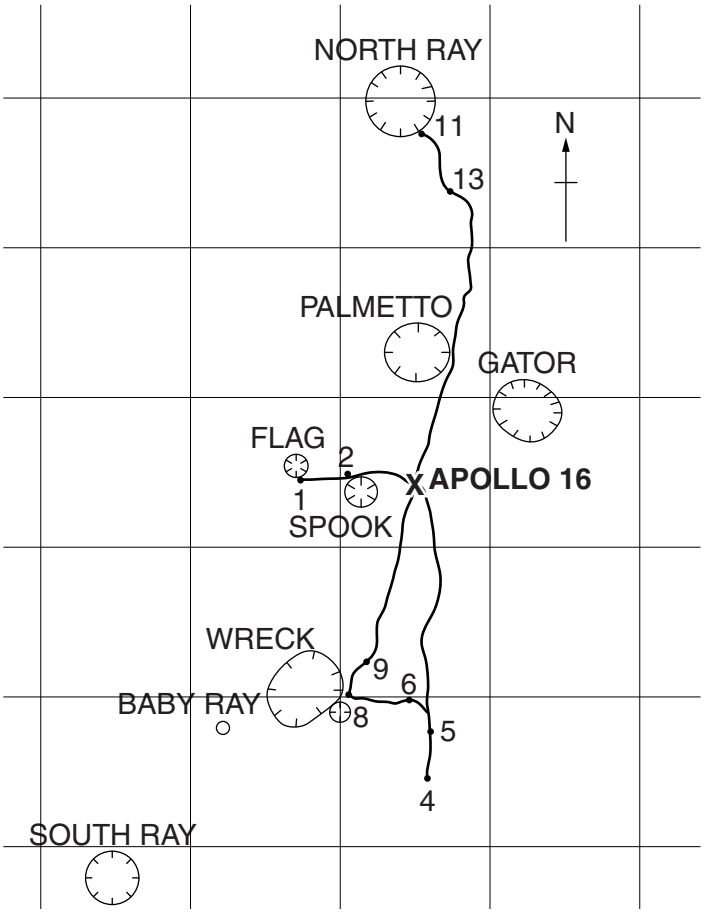
On the Earth a moon buggy weighs 210 kg.

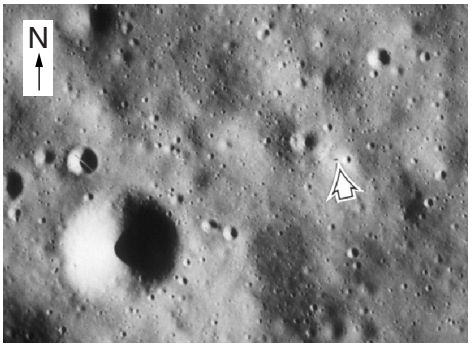
What does it weigh on the moon?

**(e)** _____ kg **[1]**

**(f)** Apollo 16 landed on the moon.
The map shows:

- where Apollo landed
- the names of some craters on the moon
- sample points where the astronauts collected rocks
- the route taken by the moon buggy




**Key:**

| | |
|---|---|
| **X** | Where Apollo 16 landed |
| | Crater |
| 13 | Rock sample point, (for example sample point 13) |
| | Route taken by moon buggy |

**(i)** Which crater is North East of Apollo 16?

**(f)(i)** _____ **[1]**

**(ii)** Which sample point is on a bearing of 007° from Apollo 16?

**(ii)** _____ **[1]**

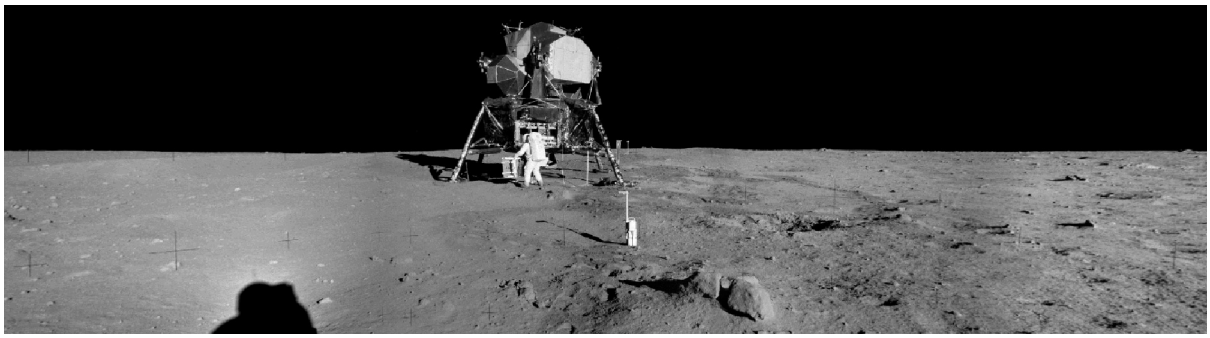
**(iii)** Which sample point is on a bearing of 168° from sample point 1?

**(iii)** _____ **[1]**

**(iv)** Measure the bearing of sample point 13 from sample point 1.

**(iv)** _____ **[1]**

**(g)** The distance to the moon's horizon is the furthest distance away that objects can be seen. This distance depends on the radius of the moon.



This rule gives the distance to the horizon for someone standing up.

- Multiply the radius of the planet, in kilometres, by 0.004
- then use a calculator to find the square root of this number

The answer is the distance to the horizon in kilometres.

The moon has a radius of 1750 kilometres.

**(i)** Use the rule to find how far away the horizon is for an astronaut standing on the moon. Give your answer as it appears on your calculator.

**(g)(i)** _____ km **[2]**

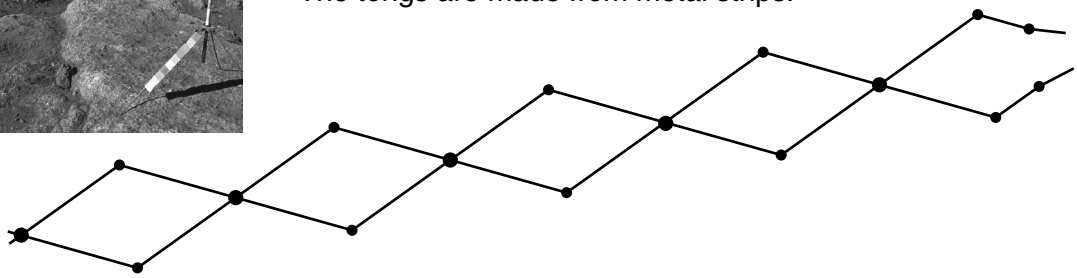
**(ii)** Give your answer to part **(i)** correct to the nearest kilometre.

**(ii)** _____ km **[1]**

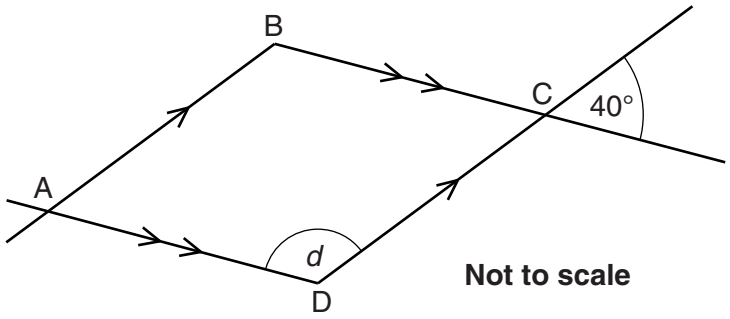
**(h)** 

Astronauts use tongs to help pick up rocks.

The tongs are made from metal strips.



The strips make parallelograms which have equal length sides.




**Not to scale**

**(i)** What is the mathematical name for the quadrilateral ABCD?

**(h)(i)** _____ **[1]**

**(ii)** Find the size of angle *d*.

**(ii)** *d* = _____ ° **[2]**

**(i)** Astronauts weighed nine rock samples.

Here are the masses of the rock samples.

| | | | | |
|---|---|---|---|---|
| 4 | 2 | 18 | 2 | 4 |
| 10 | 6 | 11 | 3 | |

The astronauts wanted to put the rock samples into two boxes.
They wanted the total mass of each box to be the same.

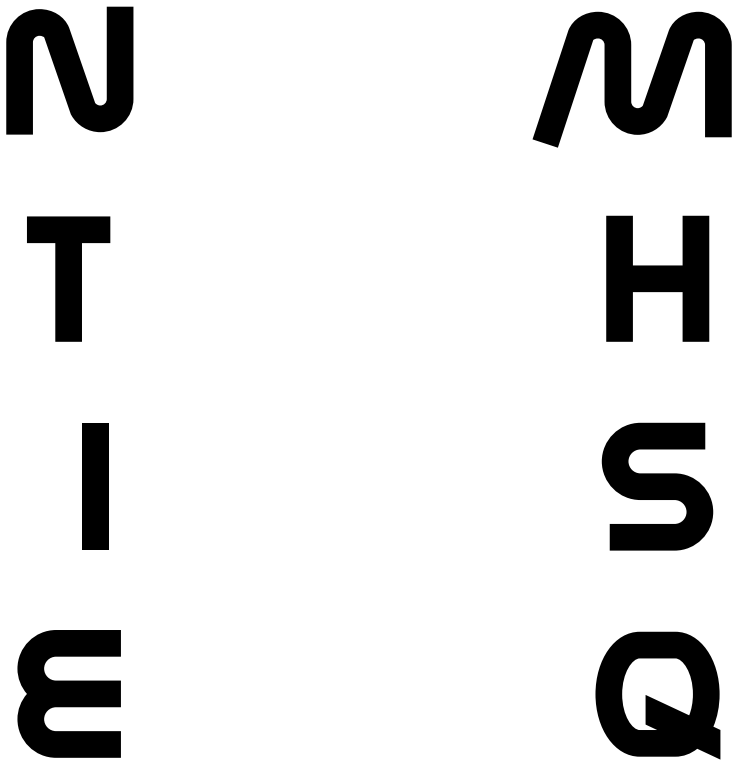
Show how they could do this.
Show what you do to get your answer.

Box 1 _____

Box 2 _____

**[3]**

**(j)** Apollo was sent to the moon by NASA
(the National Aeronautical and Space Administration).
NASA uses these letters.



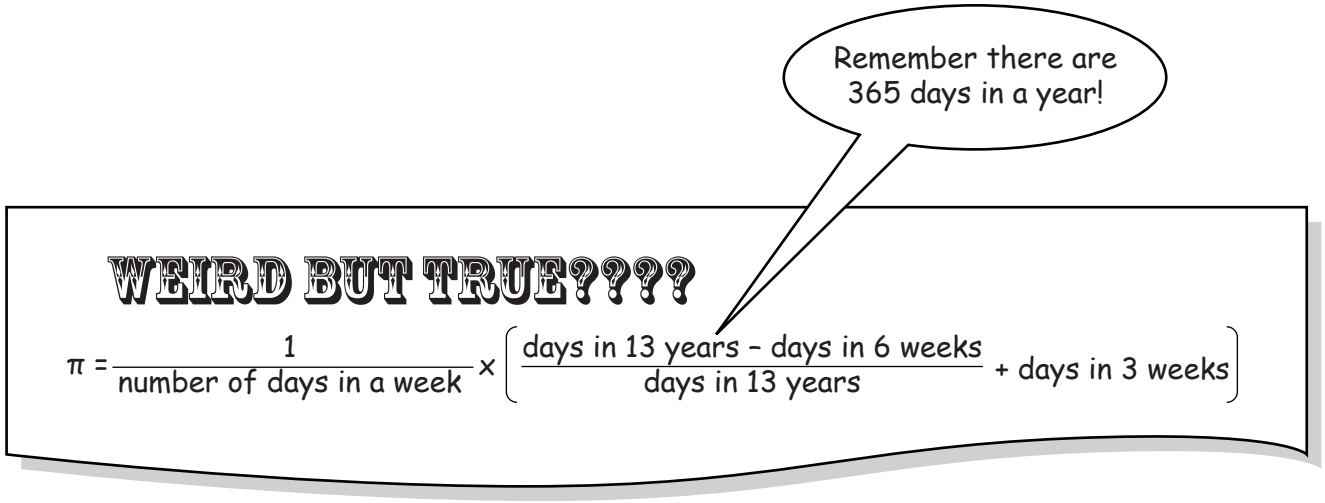
**(i)** Which of the letters have reflection symmetry?

**(j)(i)** _____ **[2]**

**(ii)** Which of the letters have rotation symmetry?

**(ii)** _____ **[2]**

**3*** Amy found this statement about $\pi$ in a book.




How close is this value for $\pi$ to the one on your calculator?
Support your answer with numbers.

_____

_____

_____

_____

_____

_____ **[3]**

**4** **(a)** In the 14th century there were some coins that are not used today.
Three of these were groats, pennies and farthings.

Item removed due to third party copyright restrictions.

Groat Penny Farthing

**(i)** A groat was worth 4 pennies.
A penny was worth 4 farthings.

How many farthings would make three groats?

**(a)(i)** _____ **[1]**

**(ii)** Farthings were used in the UK until 1960.

How many years ago were farthings last used?


**(ii)** _____ **[1]**

**(iii)** In 1881 there was a coin worth a third of a farthing.

What fraction of a penny was this coin worth?


**(iii)** _____ **[1]**

**(b)** This table shows the numbers of different coins in circulation on 31 March 2010.

| Coin value | Number of coins (millions) |
|---|---|
| £2 | 345 |
| £1 | 1,474 |
| 50p | 845 |
| 20p | 2,473 |
| 10p | 1,651 |
| 5p | 3,774 |
| 2p | 6,664 |
| 1p | 11,215 |
| Total | 28,441 |

**(i)** Which of the coins had the largest number in circulation?

**(b)(i)** _____ **[1]**

**(ii)** How many million more £1 coins than £2 coins were in circulation?

**(ii)** _____ million **[1]**

**(iii)** Which coin makes up slightly less than 25% of the total number of coins in circulation?

**(iii)** _____ **[1]**

**(c)** Some euro coins are made from Nordic Gold.
Nordic Gold has no gold in it!
Nordic Gold is 89% copper, 5% zinc and 1% tin.
The rest is aluminium.


**(i)** What percentage of Nordic Gold is aluminium?

**(c)(i)** _____ % **[1]**

**(ii)** A €0.50 coin is made from Nordic Gold and weighs 7.8 g.

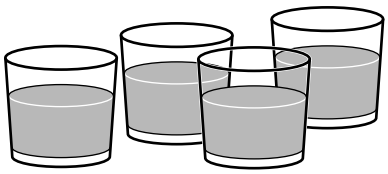
What weight of tin is there in a €0.50 coin?

**(ii)** _____ g **[2]**

**5** These are the ingredients for making four portions of raspberry fool.

**Raspberry Fool**
**Makes 4 portions**

240 g raspberries
50 g sugar
150 ml cream
150 ml yoghurt



**(a)** Teresa makes 6 portions of raspberry fool.

Complete this list of ingredients she will use.

..... g raspberries

..... g sugar

..... ml cream

..... ml yoghurt **[2]**

**(b)** John also makes raspberry fool.
He uses 600 g of raspberries.

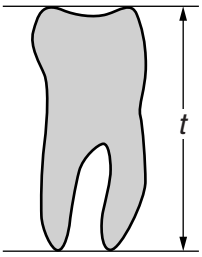
How many portions does he make?

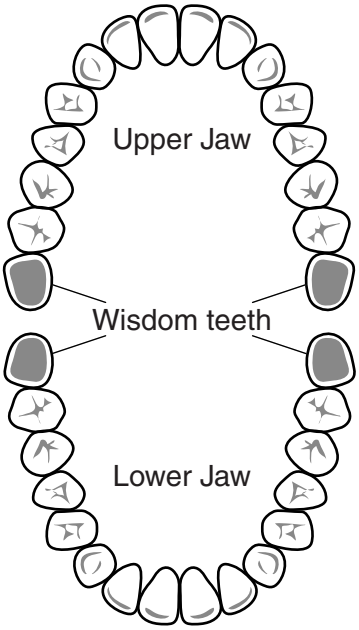
**(b)** _____ **[2]**

**6** You can find a person's age by measuring the length of one of their wisdom teeth.

The person must be under 20 years old.

Forensic scientists use this method when they investigate old graves.




The age of the person, $a$ years, is given by the formula

$$a = 8 + 0.7t$$

where $t$ is the length of one of their wisdom teeth in millimetres.

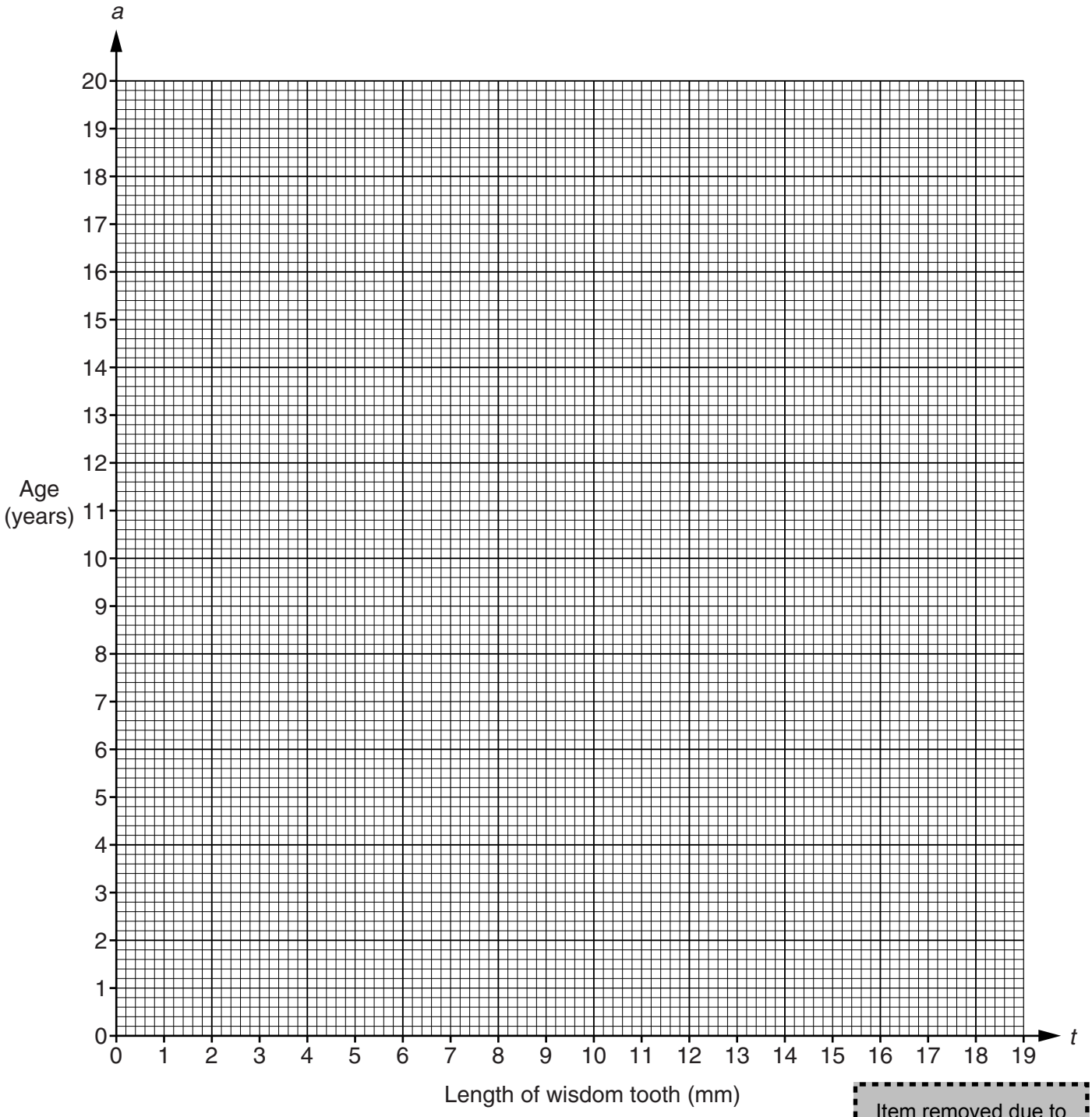
**(a)** Complete this table.

| Length of wisdom tooth ($t$ mm) | 5 | 10 | 15 |
|---|---|---|---|
| Age of person ($a$ years) | 11.5 | | |

**[2]**

**(b)** Plot these points on the grid on the next page.
Draw the line through the points.

**[2]**




Item removed due to third party copyright restrictions.

**(c)** This is a full size picture of a wisdom tooth found in an old Saxon grave. Use the graph to find the age of the person the tooth belonged to.

_____

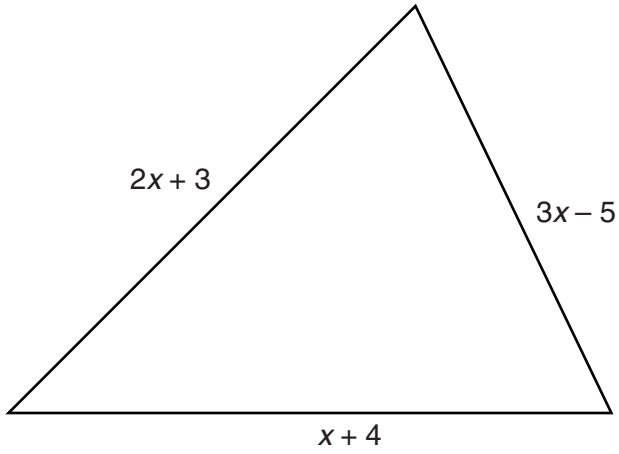
_____ **[2]**

**(d)** Explain how you tell from the graph that the formula does not work for people less than about 8 years old.

_____

_____ **[1]**

**7** The diagram shows a sketch of a triangle.
Expressions for the lengths of the sides are given.




**Not to scale**

**(a)** Write an expression for the perimeter of the triangle.
Give your expression in its simplest form.

**(a)** _____ **[2]**

**(b)** Show that when $x = 8$, the triangle is isosceles.

_____

_____

_____

_____

_____ **[2]**