

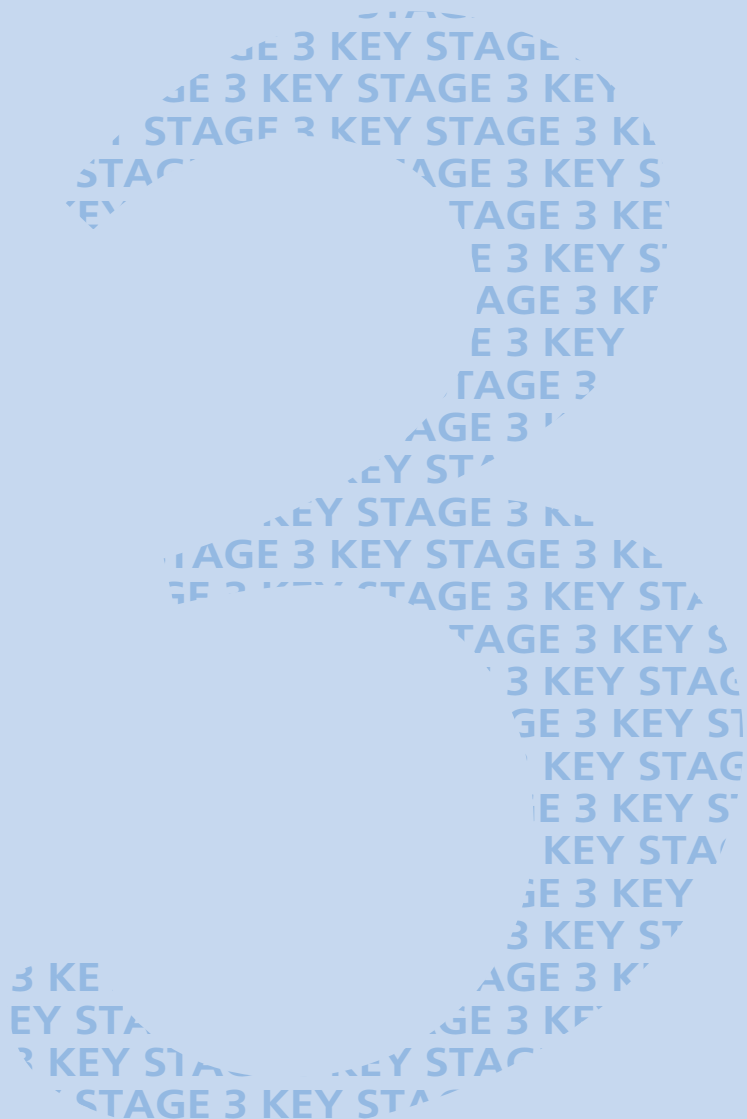
Ma

KEY STAGE
3

LOWER TIER &
HIGHER TIERS

2002

Mark schemes for Mental arithmetic Tests A, B and C



department for

education and skills

creating opportunity, releasing potential, achieving excellence

Guarding standards

First published in 2002

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Introduction

This booklet contains the mark schemes for the higher tiers tests (Tests A and B) and the lower tier test (Test C). The pupil answer sheets will be marked by external markers who will follow the mark schemes in this booklet, which are provided here for teachers' reference.

General guidance for markers

Please note that pupils should not be penalised if they record any information given in the question or show their working. Ignore any annotation, even if in the answer space, and mark only the answer. Accept an unambiguous answer written in the stimulus box, or elsewhere on the page, but clearly attributable to the relevant question.

General guidance for marking the written tests also applies to marking the mental arithmetic tests. In addition, please apply the following principles unless specific instructions to the contrary are given in the mark scheme:

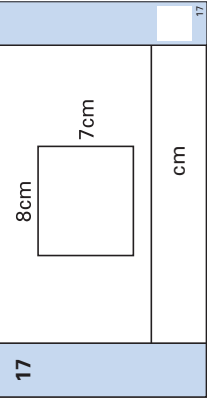
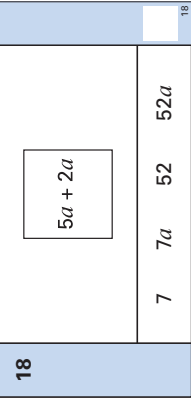
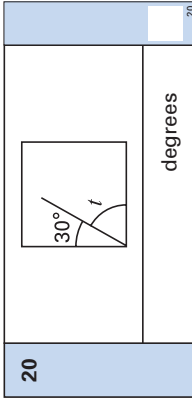
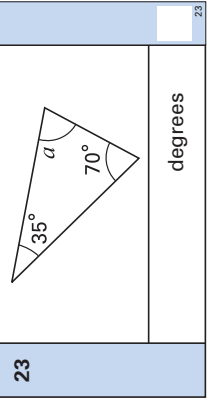
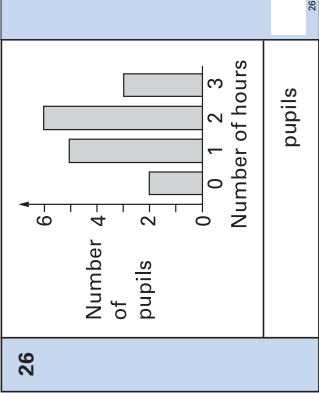
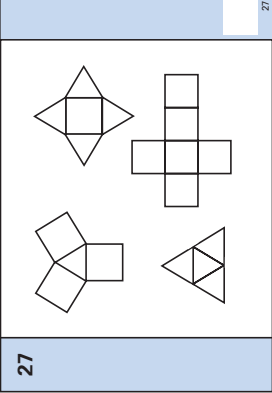
- accept responses in words and/or figures,
eg 7 point 3, 4 hundred;
- accept any unambiguous indication of the correct response from a given list,
eg circling, ticking, underlining;
- accept unambiguous misspellings;
- accept units that have been correctly converted to a different unit provided the new unit is indicated. Where units have been given on the answer sheet, do not penalise pupils for writing the units again;
- accept responses with commas as spacers,
eg 50,000
but do not accept a point used as a spacer,
eg 50.000

17	Look at the rectangle. What is its perimeter?
18	Look at the expression in the square. Which answer below is the same as the expression in the square? Ring the correct one.
19	Look at the equation. When x equals five, what is the value of y ?
20	The diagram shows a line inside a square. What is the size of the angle labelled t ?
21	In my family, the range of heights is thirty-five centimetres. The height of the shortest person is one hundred and twenty-five centimetres. What is the height of the tallest person?
22	Multiply four point seven by one hundred.
23	Look at the triangle. Work out the size of angle a
24	What is the next prime number after nineteen?
25	What is twenty per cent of three hundred pounds?

'For the next group of questions, you will have 15 seconds to work out each answer and write it down.'

26	I asked some pupils how many hours they spent on their homework last night. The bar chart shows the results. Altogether, how many pupils did I ask?
27	Which of the nets on your sheet will fold to make a triangular-based pyramid? Put a tick inside the correct net.
28	A jar of coffee costs one pound twenty pence. I buy three jars of coffee. How much change should I get from twenty pounds?
29	What fraction of one kilogram is two hundred and fifty grams?
30	I am thinking of two numbers that add to twelve. One of the numbers is double the other. What are my two numbers?

'Put your pens down. The test is finished.'

<p>Time: 10 seconds continued</p> <p>17  17</p> <p>18  18</p> <p>19 $y = 3x + 6$ 19</p> <p>20  20</p> <p>21 cm 125 cm 21</p> <p>22 4.7 22</p> <p>23  23</p>	<p>Time: 10 seconds continued</p> <p>24 <input type="text"/> 19 24</p> <p>25 £ <input type="text"/> 20% 25</p> <p>Time: 15 seconds</p> <p>26  26</p> <p>27  27</p> <p>28 £ <input type="text"/> £ 1.20 28</p> <p>29 <input type="text"/> 250g 29</p> <p>30 <input type="text"/> and <input type="text"/> 30</p>
---	--

Test C

Mark scheme

Time: 5 seconds

1	71	
2	13	
3	45	
4	5	
5	6	Accept embedded value, eg 7×6
6	29 028 feet	Do not accept responses given in words
7	4	
8	3	

Time: 10 seconds

9	22	
10	120 seconds	
11	330	
12	3 hours	
13	$2\frac{1}{2}$	Accept equivalent fractions or decimals
14	$5 \text{ cm} \leq \text{answer} \leq 6 \text{ cm}$	
15	5 pupils	Do not accept incorrect units, eg 5% or 5°
16	£ 1.50	Accept $1\frac{1}{2}$

Time: 10 seconds continued

17	30 cm	
-----------	--------------	--

18	7 $7a$ 52 52 <i>a</i>	
-----------	--	--

19	21	
-----------	-----------	--

20	60 degrees	
-----------	-------------------	--

21	160 cm	
-----------	---------------	--

22	470	Accept equivalent values, eg 470.0
-----------	------------	------------------------------------

23	75 degrees	
-----------	-------------------	--

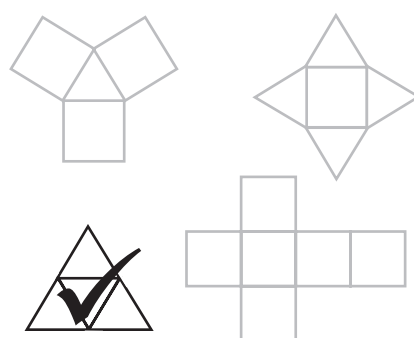
Time: 10 seconds continued

24	23	
-----------	-----------	--

25	£ 60	Do not accept 60%
-----------	-------------	-------------------

Time: 15 seconds

26	16 pupils	
-----------	------------------	--

27		
-----------	---	--

28	£ 16.40	
-----------	----------------	--

29	$\frac{1}{4}$	Accept equivalent fractions or decimal fractions, but not 25%
-----------	---------------	---

30	4 and 8	Accept in either order. Do not accept incomplete processing, eg 1×4 , 2×4
-----------	----------------	---

Higher tiers Test A questions

'Now we are ready to start the test.

For this first group of questions, you will have 5 seconds to work out each answer and write it down.'

1	I start at one point seven and count up in equal steps. One point seven, one point eight, one point nine, ... What is the next number?
2	How many faces has a cube?
3	When m equals three, what is the value of five m ?
4	Look at the numbers on your answer sheet. Add them.
5	What is the sum of the angles in a triangle?
6	Write the ratio twelve to six in its simplest form.
7	Multiply nought point two by nought point three.

'For the next group of questions, you will have 10 seconds to work out each answer and write it down.'

8	Double seventy-eight.
9	The pictogram shows the number of boys and girls in a year group that had part-time jobs. How many more boys than girls had part-time jobs?
10	What number is the arrow pointing to on the number line?
11	There are red, blue and yellow balls in a bag. I am going to take out one ball at random. The table shows the probabilities of getting a red ball and of getting a blue ball. What is the probability of getting a yellow ball?
12	Look at the expression. Simplify it.
13	AB is a straight line. Work out the size of angle x .
14	A teacher asked pupils in a class 'Do you eat meat?' The percentage bar chart shows the results. Estimate the percentage of pupils that said no.

'Now turn over your answer sheet.'

Pupil answer sheet

Key stage 3 mathematics 2002
Mental arithmetic Test A

First name _____

Last name _____


School _____

Pupil number Total marks

Time: 10 seconds

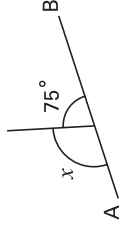
8	<input type="text"/>	<input type="text"/>	78	<input type="text"/>
---	----------------------	----------------------	----	----------------------

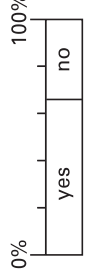
9	Key: $\diamond = 8$ pupils	<input type="text"/>				
	Boys <table border="1"><tr><td>\diamond</td><td>\diamond</td><td>\diamond</td><td>\diamond</td></tr></table>	\diamond	\diamond	\diamond	\diamond	<input type="text"/>
\diamond	\diamond	\diamond	\diamond			
	Girls <table border="1"><tr><td>\diamond</td><td>\diamond</td><td>\diamond</td><td>\triangle</td></tr></table>	\diamond	\diamond	\diamond	\triangle	<input type="text"/>
\diamond	\diamond	\diamond	\triangle			

10		<input type="text"/>
----	---	----------------------

11	<table border="1"><tr><td>red</td><td>blue</td><td>yellow</td></tr><tr><td>0.2</td><td>0.5</td><td>?</td></tr></table>	red	blue	yellow	0.2	0.5	?	<input type="text"/>
red	blue	yellow						
0.2	0.5	?						

12	<input type="text"/>	<input type="text"/>	$7a + 2b + 3a + 5b$	<input type="text"/>
----	----------------------	----------------------	---------------------	----------------------

13		<input type="text"/>
	degrees	<input type="text"/>

14		<input type="text"/>
	%	<input type="text"/>

Practice question

<input type="text"/>	<input type="text"/>	70	80	<input type="text"/>
----------------------	----------------------	----	----	----------------------

Time: 5 seconds

1	1.7	1.8	1.9	<input type="text"/>
---	-----	-----	-----	-------	----------------------

2	<input type="text"/>	<input type="text"/>
---	----------------------	----------------------

3	<input type="text"/>	<input type="text"/>	$5m$	<input type="text"/>
---	----------------------	----------------------	------	----------------------

4	<input type="text"/>	<input type="text"/>	-7	9	<input type="text"/>
---	----------------------	----------------------	----	---	----------------------

5	<input type="text"/>	degrees	<input type="text"/>
---	----------------------	---------	----------------------

6	<input type="text"/>	<input type="text"/>	12 : 6	<input type="text"/>
---	----------------------	----------------------	--------	----------------------

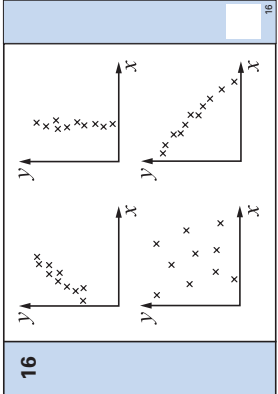
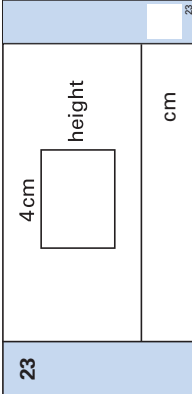
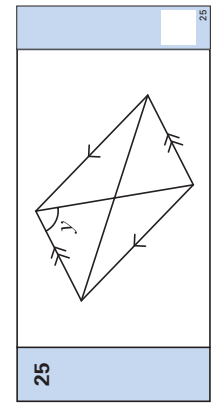
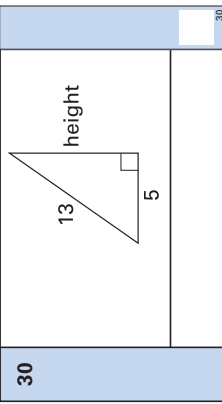
7	<input type="text"/>	<input type="text"/>	0.2	0.3	<input type="text"/>
---	----------------------	----------------------	-----	-----	----------------------

15	What is the total cost of three books at nine pounds ninety-nine pence each?
16	Which scatter diagram shows strong negative correlation? Ring the correct answer.
17	Forty per cent of a number is twelve. What is the number?
18	Look at the expression. Multiply out the brackets.
19	Look at the numbers. One of them is the decimal equivalent of one eighth. Ring the correct number.
20	Look at the expression. What is the value of this expression when k equals three?
21	A drink uses apple juice and carrot juice in the ratio two to three. I want to make a litre of this drink. How many millilitres of apple juice should I use?
22	The volume of a cube is sixty-four centimetres cubed. What is the length of an edge of the cube?

'For the next group of questions, you will have 15 seconds to work out each answer and write it down.'

23	The diagram shows a rectangle. Its perimeter is twelve centimetres. What is the height of the rectangle?
24	How many hours are there in one week?
25	Look at the diagram. Mark on the diagram another angle that is the same size as angle y . Label it y .
26	A computer game cost forty-two pounds. Its price increased by ten per cent. What is the new price of the computer game?
27	The table shows the number of goals scored in fourteen matches. How many goals were scored altogether?
28	Work out the answer to the calculation on your answer sheet.
29	x squared equals nine. What are the possible values of ten minus x ?
30	Look at the right-angled triangle. Work out the height of the triangle.

'Put your pens down. The test is finished.'

Time: 10 seconds continued		Time: 15 seconds continued											
15	£	£9.99	15										
16													
17		40%	12										
18		$a(a + 2)$	18										
19	0.125	0.18	0.215										
	0.8	1.8	19										
20		$10k^2$	20										
21	ml	2 : 3	21										
22		cm	22										
Time: 15 seconds													
23													
24	hours		24										
25													
26	£	£42	26										
27	<table border="1" data-bbox="670 78 949 481"> <thead> <tr><th>Number of goals</th><th>Frequency</th></tr> </thead> <tbody> <tr><td>0</td><td>4</td></tr> <tr><td>1</td><td>3</td></tr> <tr><td>2</td><td>6</td></tr> <tr><td>3</td><td>1</td></tr> </tbody> </table>			Number of goals	Frequency	0	4	1	3	2	6	3	1
Number of goals	Frequency												
0	4												
1	3												
2	6												
3	1												
28		$2^4 \times 3^2$	28										
29	and	$x^2 = 9$ $10 - x$	29										
30													

Test A

Mark scheme

Time: 5 seconds

1	2(.0)	
---	-------	--

2	6	
---	---	--

3	15	
---	----	--

4	2	
---	---	--

5	180 degrees	
---	-------------	--

6	2 : 1	Accept 2 to 1 Do not accept fraction notation, eg $\frac{2}{1}$ or incorrect ordering, eg 1 : 2 or ratio not in its simplest form
---	-------	---

7	0.06	Accept equivalent fractions or decimals
---	------	--

Time: 10 seconds

8	156	
---	-----	--

9	12	
---	----	--

10	-2	Do not accept 2-
----	----	------------------

11	0.3	Accept equivalent probabilities
----	-----	------------------------------------

12	$10a + 7b$	Do not accept partially simplified expressions, eg $10a + 2b + 5b$
----	------------	---

13	105 degrees	
----	-------------	--

14	$32 \% \leq \text{answer} \leq 36 \%$	
----	---------------------------------------	--

Time: 10 seconds continued

15	£ 29.97	
-----------	----------------	--

16		
-----------	--	--

17	30	Do not accept 30%
-----------	-----------	-------------------

18	$a^2 + 2a$	Accept $a \times a$ for a^2
-----------	------------------------------	-------------------------------

19	<table style="display: inline-table; border: none;"> <tr> <td style="border: 1px solid black; border-radius: 50%; padding: 2px;">0.125</td> <td style="padding: 0 10px;">0.18</td> <td style="padding: 0 10px;">0.215</td> </tr> <tr> <td></td> <td style="padding: 0 10px;">0.8</td> <td style="padding: 0 10px;">1.8</td> </tr> </table>	0.125	0.18	0.215		0.8	1.8	
0.125	0.18	0.215						
	0.8	1.8						

20	90	
-----------	-----------	--

21	400 ml	
-----------	---------------	--

22	4 cm	
-----------	-------------	--

Time: 15 seconds

23	2 cm	
-----------	-------------	--

Time: 15 seconds continued

24	168 hours	
-----------	------------------	--

25		Accept angle not labelled provided there is no ambiguity
-----------	--	--

26	£ 46.20	
-----------	----------------	--

27	18	
-----------	-----------	--

28	144	
-----------	------------	--

29	7 and 13	Accept in either order
-----------	-----------------	------------------------

30	12	Do not accept incomplete processing, eg $\sqrt{144}$
-----------	-----------	--

Higher tiers Test B questions

'Now we are ready to start the test.
For this first group of questions, you will have 5 seconds to work out each answer and write it down.'

1	How many seconds are there in one and a half minutes?
2	Look at the equation on your answer sheet. When x equals seven, what is the value of y ?
3	What number is nought point one less than two?
4	How many pairs of parallel sides does a parallelogram have?
5	Look at the fraction. Write it in its simplest form.
6	In a quiz, I got eighteen out of twenty questions correct. What percentage of questions did I get correct?
7	Nine to the power six divided by nine to the power two is equal to nine to the power what?

'For the next group of questions, you will have 10 seconds to work out each answer and write it down.'

8	Write down a number that is both a multiple of four and a multiple of six.
9	Look at the number. How much must you add to it to make four thousand?
10	In a survey, people were asked which they liked best – milk chocolate or dark chocolate. The bar chart shows the results. Sixty people said milk. About how many said dark?
11	I start at six and count back in equal steps. Six, one, minus four, ... What is the next number in my sequence?
12	Look at the spinner. It has five equal sections. What is the probability that I spin a three?
13	What is half of one hundred and seventy-six?
14	The diagram shows three equal angles. What is the size of one of the angles?
15	Look at the equation. When m equals two, what is the value of h ?

'Now turn over your answer sheet.'

Pupil answer sheet

Key stage 3 mathematics 2002
Mental arithmetic Test B

First name _____

Last name _____

School _____

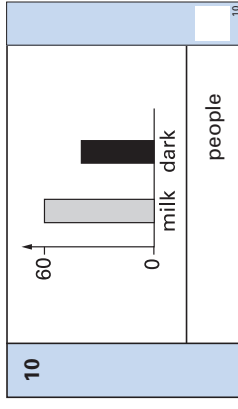
Pupil number

Total marks

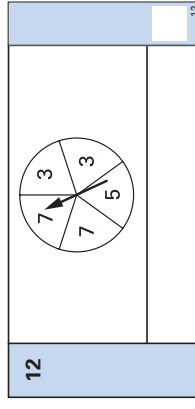
Time: 10 seconds

8

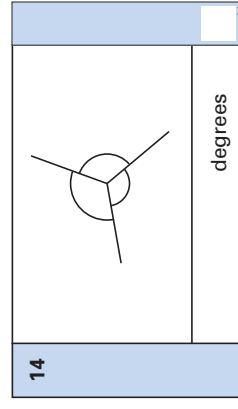
9 3096



11 6 1 -4



13 176



15 $h = 3m - 10$

Practice question

70 80

Time: 5 seconds

1 seconds

2 $y = 10 - x$

3 0.1

4

5 $\frac{5}{20}$

6 % 18

7 $9^6 \div 9^2$

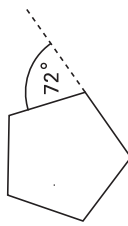
16	The exterior angle of a regular pentagon is seventy-two degrees. What size is the interior angle of the pentagon?
17	There are one hundred balls in a bag. I am going to take a ball out at random. The probability that it will be red is one fifth. How many red balls are in the bag?
18	Multiply three y by five y . Write your answer in its simplest form.
19	I am thinking of a solid shape. It has a circular base and one vertex. What is the mathematical name of this solid shape?
20	What is half of one third?
21	Your answer sheet shows the n th term of a sequence. What is the eighth term of the sequence?
22	Look at the expression. When k equals seven, what is its value?

'For the next group of questions, you will have 15 seconds to work out each answer and write it down.'

23	The diagram shows a shaded square drawn on a centimetre square grid. What is the area of the shaded square?
24	The table shows the number of goals per match scored by a team. How many matches did the team play altogether?
25	When I drive on the motorway, my car uses petrol at the rate of eleven miles per litre. How many litres should I expect to use on a motorway journey of one hundred and seventy-six miles?
26	Multiply together the first four odd numbers.
27	The diagram shows a triangle. Which value underneath the triangle shows the length of the hypotenuse? Ring the correct answer.
28	The angles of a triangle are in the ratio one to two to three. What are the sizes of the three angles?
29	I have one hundred pounds in five pence coins. How many five pence coins is that?
30	Some people were asked if they voted in an election. The pie chart shows the results. Work out the angle for the sector that represents 'No'.

'Put your pens down. The test is finished.'

Time: 10 seconds continued

16  degrees 16

17 $\frac{1}{5}$ 17

18 $3y \cdot 5y$ 18

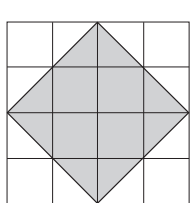
19 19

20 $\frac{1}{3}$ 20

21 $\frac{1}{2}(n-3)^2$ 21

22 $\frac{k^3}{k}$ 22

Time: 15 seconds

23  cm² 23

Time: 15 seconds continued

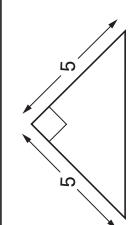
24

Number of goals	Frequency
0	4
1	5
2	6
3	4
4	1

24

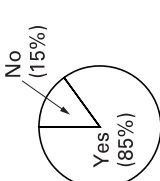
25 litres 11 miles/litre 176 miles 25

26 26

27  $\sqrt{5}$ $\sqrt{10}$ $\sqrt{50}$ $\sqrt{55}$ $\sqrt{625}$ 27

28 $1:2:3$ 28

29 29

30  degrees 30

Test B

Mark scheme

Time: 5 seconds

1	90 seconds	
2	3	
3	1.9	Accept equivalent fractions or decimals
4	2	
5	$\frac{1}{4}$	Do not accept equivalent fractions or decimals
6	90 %	
7	4 or 9^4	

Time: 10 seconds

8	12 or any other multiple of 12	
9	904	
10	35 people \leq answer \leq 45 people	
11	-9	Do not accept 9-
12	$\frac{2}{5}$	Accept equivalent probabilities
13	88	
14	120 degrees	
15	-4	Do not accept 4-

Time: 10 seconds continued

16	108 degrees	
-----------	--------------------	--

17	20	Do not accept 20%
-----------	-----------	-------------------

18	15y²	Accept $15 \times y^2$ but not $15 \times y \times y$
-----------	------------------------	--

19	Cone	Accept 'circular pyramid'
-----------	-------------	------------------------------

20	$\frac{1}{6}$	Accept equivalent fractions or 0.17 or 0.167 or 0.166(...)
-----------	---------------	--

21	$12\frac{1}{2}$	Accept equivalent decimals or fractions, including $\frac{25}{2}$ Do not accept incomplete processing, eg $25 \div 2$
-----------	-----------------	--

22	49	Accept 7^2 but not incomplete processing, eg 7×7
-----------	-----------	---

Time: 15 seconds

23	8 cm ²	
-----------	--------------------------	--

Time: 15 seconds continued

24	20	
-----------	-----------	--

25	16 litres	
-----------	------------------	--

26	105	
-----------	------------	--

27	$\sqrt{5}$ $\sqrt{10}$ $\sqrt{50}$ $\sqrt{55}$ $\sqrt{625}$	
-----------	--	--

28	30°, 60°, 90°	Accept in any order
-----------	----------------------	---------------------

29	2000	
-----------	-------------	--

30	54 degrees	
-----------	-------------------	--

EARLY YEARS

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CURRICULUM
5–16

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GCE A LEVEL

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