

Higher GCSE Mathematics Revision Pack

NUMBER – NON-CALC

Q1. (a) Write 6.4×10^4 as an ordinary number.

..... (1)

(b) Write 0.0039 in standard form.

..... (1)

(c) Write 0.25×10^7 in standard form.

..... (1)

(Total 3 marks)

Q2. Find the value of

(i) 8^0
.....

(ii)
 $\left(\frac{1}{3}\right)^{-2}$
.....

(iii)
 $(16^{-2})^{-\frac{3}{4}}$
.....

(Total 4 marks)

Q3. (a) Write the number 45 000 in standard form.

..... (1)

(b) Write 6×10^{-2} as an ordinary number.

..... (1)

(Total 2 marks)

Q4. The table shows the costs, per person, of a holiday at two different hotels. It shows the cost for 5 nights and the cost for each extra night. It also shows the discount for each child.

	Park Palace		Dubai Grand	
Date holiday starts	5 nights	extra night	5 nights	extra night
01 Jan – 31 Mar	£1169	£150	£849	£86
01 Apr – 09 Apr	£1229	£150	£1219	£95
10 Apr – 15 Jul	£810	£80	£853	£53
16 Jul – 20 Aug	£810	£80	£854	£53
21 Aug – 10 Dec	£810	£80	£869	£94
Discount for each child	$\frac{1}{5}$ off		15% off	

There are two adults and two children in the Smith family.
The family want a holiday for 7 nights, starting on 1st August.

One hotel will be cheaper for them than the other hotel.

Work out the cost of the cheaper holiday.
You must show all your working.

£

(Total 6 marks)

Q5. Write down the value of

(i) 7^0
.....

(ii) 5^{-1}
.....

(iii) $8\frac{1}{2}$
.....

(Total 3 marks)

- Q6.** Work out $(2.5 \times 10^9) \div (5 \times 10^3)$.
Give your answer in standard form.

.....

(Total 2 marks)

- Q7.** Prove that the recurring decimal

$$0.\dot{1}\dot{7} = \frac{17}{99}$$

(Total 2 marks)

- Q8.** Change the recurring decimal $0.\dot{2}\dot{3}$ to a fraction.

.....

(Total 2 marks)

- Q9. (a)** Write down the value of 2^{-1}

.....

(1)

- (b)** Write down the value of $64^{\frac{1}{2}}$

.....

(1)

(Total 2 marks)

- Q10.** Prove that $0.4\dot{7}\dot{3}$ can be written as the fraction

$$\frac{469}{990}$$

(Total 2 marks)

- Q11. (a)** Find the value of

$$36^{\frac{1}{2}}$$

.....

(1)

- (b)** Find the value of $8^{\frac{2}{3}}$

.....

(2)

(Total 3 marks)

Q12. (a) Rationalise the denominator of $\frac{1}{\sqrt{3}}$

.....

(1)

(b) Expand $(2 + \sqrt{3})(1 + \sqrt{3})$

Give your answer in the form $a + b\sqrt{3}$ where a and b are integers.

.....

(2)

(Total 3 marks)

Q13. Expand and simplify

$$(2 + \sqrt{3})(7 - \sqrt{3})$$

Give your answer in the form $a + b\sqrt{3}$, where a and b are integers.

.....

(Total 3 marks)

Q14. Express the recurring decimal $0.2\dot{1}\dot{3}$ as a fraction.

.....

(Total 3 marks)

Q15. (a) Write the number 39 000 in standard form.

.....

(1)

(b) Write 7.21×10^{-3} as an ordinary number.

.....

(1)

(Total 2 marks)

Q16. M is directly proportional to L^3 .

When $L = 2$, $M = 160$

Find the value of M when $L = 3$

.....

(Total 4 marks)

Q17. (a) Write 64 000 in standard form.

.....

(1)

(b) Write 156×10^{-7} in standard form.

.....

(1)

(Total 2 marks)

Q18. $\sqrt{3} = 3^k$

(a) Write down the value of k

.....

(1)

(b) Expand and simplify $(2 + \sqrt{3})(1 + \sqrt{3})$

Give your answer in the form $a + b\sqrt{3}$

where a and b are integers

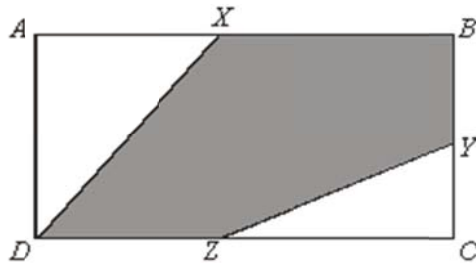
.....

(2)

(Total 3 marks)

Q19.

Diagram **NOT** accurately drawn



$ABCD$ is a rectangle.

X is the midpoint of AB .

Y is the midpoint of BC .

Z is the midpoint of CD .

What fraction of the total area of $ABCD$ is shaded?

Show clearly how you get your answer.

.....

(Total 4 marks)

Q20. The population of Algeria is 34 million.

(a) Write 34 million in standard form.

.....

(1)

The total land area of Algeria is $2.4 \times 10^{12} \text{ m}^2$.

5% of the total land area is used to grow crops.

(b) Work out the area of land in Algeria which is used to grow crops.
Write your answer in standard form, in km^2 .

..... km^2

(2)

(Total 3 marks)

M1.

	Answer	Mark	Additional Guidance
(a)	64000	1	B1 for 64000
(b)	3.9×10^{-3}	1	B1 for 3.9×10^{-3}
(c)	2.5×10^6	1	B1 for 2.5×10^6
Total for Question: 3 marks			

M2.

	Working	Answer	Mark	Additional Guidance
(i)		1	4	B1 cao
(ii)	$\left(\frac{3}{1}\right)^2$ or $\left(\frac{1}{9}\right)^{-1}$	9		B1 cao
(iii)	$(16)^{\frac{3}{2}} = (\sqrt{16})^3$	64		B2 cao [B1 cao for $(16)^{3/2}$ or equivalent]
Total for Question: 4 marks				

M3.

	Answer	Mark	Additional Guidance
(a)	4.5×10^4	1	B1 for 4.5×10^4 cao
(b)	0.06	1	B1 for 0.06 cao
Total for Question: 2 marks			

M4.

Working	Answer	Mark	Additional Guidance
Park Palace: $810 + 80 + 80 = \text{£}970$ per adult	Park Palace £3492	6	M1 for identifying correct week for holiday

$\frac{1}{5}$ of 970 = 194 $970 - 194 = \text{£}776$ per child $970 + 970 + 776 + 776 = \text{£}3492$ Dubai Grand: $854 + 53 + 53 = \text{£}960$ per adult $10\% + 5\%$ of 960 = $96 + 48$ $= 144$ $960 - 144 = \text{£}816$ per child $960 + 960 + 816 + 816 = \text{£}3552$		(eg use of 854 for DG, eg circle correct row) M1 for using 7 nights for at least one hotel M2 for complete correct method for reduction of $\frac{1}{5}$ and 15% for at least 5 nights (M1 for correct method to get $\frac{1}{5}$ or 15% or $\frac{4}{5}$ or 85% of a total for at least 5 nights) A1 for one correct total (3492 or 3552) A1 for 34 92 and 3552, with Park Palace (or 3492) indicated as the best choice.
Total for Question: 6 marks		

M5.

	Answer	Mark	Additional Guidance
(i)	1	1	B1 cao
(ii)	$\frac{1}{5}$	1	B1 for $\frac{1}{5}$ or 0.2
(iii)	3	1	B1 cao (accept ± 3)
Total for Question: 3 marks			

M6.

Working	Answer	Mark	Additional Guidance
0.5×10^6	5×10^5	2	M1 for 0.5×10^6 or 500000 or $2.5 \div 0.5 \times 10^6$ or $0.5 \times 10^{9-3}$ OR $25000000000 \div 5000$ A1 cao
Total for Question: 2 marks			

M7.

Working	Answer	Mark	Additional Guidance
$x = 0.1717...$ $100x = 17.1717...$	Proof	2	M1 for valid method eg $100x = 17.17...$, $1x = 0.1717...$ and subtract

$99x = 17$ $x = \frac{17}{99}$ or $1000x = 171.7171\dots$ $10x = 1.7171\dots$ $990x = 170$ $x = 17/99$			OR $1000x = 171.7171\dots$, $10x = 1.7171\dots$ and subtract $x = \frac{17}{99}$ A1 for valid argument leading to $x = \frac{17}{99}$ Alternative method for long division M1 for identifying 71 and 17 as remainders A1 for correct statement
Total for Question: 2 marks			

M8.

Working	Answer	Mark	Additional Guidance
$100 \times 0.\dot{2}\dot{3} = 23.\dot{2}\dot{3}$ $99 \times 0.\dot{2}\dot{3} = 23$	23 99	2	M1 for $100 \times 0.\dot{2}\dot{3}$ or $10000 \times 0.\dot{2}\dot{3} \dots$ $\frac{23}{99}$ A1 for $\frac{23}{99}$ oe
Total for Question: 2 marks			

M9.

	Answer	Mark	Additional Guidance
(a)	0.5	1	$\frac{1}{2}$ B1 for 0.5 or $\frac{1}{2}$
(b)	8	1	B1 for 8 accept -8
Total for Question: 2 marks			

M10.

Working	Answer	Mark	Additional Guidance
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$100x = 47.3737\dots$ $x = 0.4737\dots$ $99x = 46.9$ $x = 46.9/99$	proof	2	M1 for valid method eg $100x = 47.37373$, $1x = 0.4737\dots$ and subtract OR $1000x = 473.7373$, $10x = 4.737\dots$ and subtract <div style="text-align: right;">$\frac{469}{990}$</div> A1 for valid argument leading to
Total for Question: 2 marks			

M11.

	Answer	Mark	Additional Guidance
(a)	6	1	B1 for 6 or ± 6
(b)	$\frac{1}{4}$	2	M1 for $8^{\frac{1}{3}} = 2$ or $\frac{1}{8^{\frac{2}{3}}}$ or 4^{-1} or $64^{-\frac{1}{3}}$ or 2^2 or 4 or $\frac{1}{2^2}$ or 2^{-2} A1 for $\frac{1}{4}$ or 0.25 or any equivalent vulgar fraction or decimal
Total for Question: 3 marks			

M12.

	Working	Answer	Mark	Additional Guidance
(a)	$\frac{1}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$	$\frac{\sqrt{3}}{3}$	1	B1 for $\frac{\sqrt{3}}{3}$ or $\frac{k\sqrt{3}}{3k}$ or $\frac{\sqrt{3k^2}}{3k}$, where k is an integer not equal to 0 $\frac{1\sqrt{3}}{3}, \frac{\sqrt{1}\sqrt{3}}{3}$ or $\frac{3^{0.5}}{3}$ (accept)
(b)	$2 \times 1 + 2 \times \sqrt{3} +$ $1 \times \sqrt{3} + \sqrt{3} \times$ $\sqrt{3}$	$5 + 3\sqrt{3}$	2	M1 for $2 \times 1 + 2 \times \sqrt{3} + 1 \times \sqrt{3} + 3 \times \sqrt{3}$ or three of 2, $2\sqrt{3}$, $\sqrt{3}$, $\sqrt{9}$ (or 3 or $\sqrt{3^2}$ or ($\sqrt{3}$) ²) A1 for $5 + 3\sqrt{3}$ cao (SC: B1 for $a + 3\sqrt{3}$ or $5 + b\sqrt{3}$ if M0 scored,

				where a and b are integers not equal to 0)
Total for Question: 3 marks				

M13.

Working	Answer	Mark	Additional Guidance
$2 \times 7 - 2 \times \sqrt{3} + 7 \times \sqrt{3} - \sqrt{3} \times \sqrt{3} =$ $14 + 5\sqrt{3} - 3$	$11 + 5\sqrt{3}$	3	M1 for exactly 3 or exactly 4 terms correct including correct signs or all 4 terms correct with wrong signs. M1 (dep) for either collecting their two or three terms in $\sqrt{3}$ or for $\sqrt{3} \times \sqrt{3} = 3$ A1 cao
Total for Question: 3 marks			

M14.

Working	Answer	Mark	Additional Guidance
$x = 0.213131313\dots$ $10x = 2.13131313\dots$ $1000x = 213.131313\dots$ $990x = 211$	$\frac{211}{990}$	3	M1 for 0.2131313.... or $0.2 + 0.0131313\dots$ (dots MUST be included) M1 for two correct recurring decimals that, when subtracted, leave a terminating decimal $\frac{211}{990}$ A1 for $\frac{211}{990}$
Total for Question: 3 marks			

M15.

	Answer	Mark	Additional Guidance
(a)	3.9×10^4	1	B1 cao
(b)	0.00721	1	B1 cao
Total for Question: 2 marks			

M16.

Working	Answer	Mark	Additional Guidance
$M = kL^3$ $k = \frac{M}{L^3} = \frac{160}{8} = 20$ When $L = 3$, $M = 20 \times 3^3$	540	4	M1 for $M \propto L^3$ or $M = kL^3$ A1 $k = 20$ M1 for $'20' \times 3^3$ A1 for 540 cao
Total for Question: 4 marks			

M17.

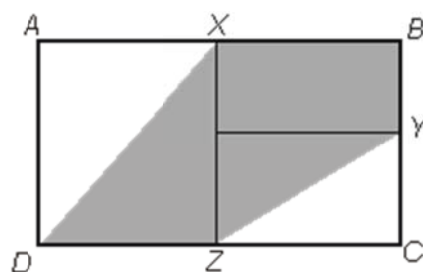
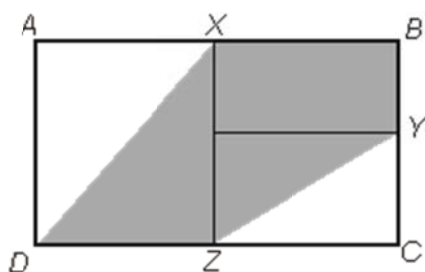
	Answer	Mark	Additional Guidance
(a)	6.4×10^4	1	B1 cao
(b)	1.56×10^{-6}	1	B1 cao
Total for Question: 2 marks			

M18.

	Working	Answer	Mark	Additional Guidance
(a)		$\frac{1}{2}$	1	B1
(b)	$(2 + \sqrt{3}) \times (1 + \sqrt{3})$ $= 2 + 2\sqrt{3} + \sqrt{3} + \sqrt{9}$	$5 + 3\sqrt{3}$	2	M1 4 term expansion with 3, 4 terms correct and sight of 3 or $\sqrt{9}$ A1 cao
Total for Question: 3 marks				

M19.

Working	Answer	Mark	Additional Guidance
<p>Let $AB = x$, $AD = y$</p> <p>Area of rectangle = xy</p> <p>Area $AXD = \frac{xy}{4}$</p> <p>Area $CYZ = \frac{xy}{8}$</p> <p>Shaded area = $\frac{5xy}{8}$</p>	$\frac{5}{8}$	4	<p>M1 a full method to find the unshaded area and subtracting from 1</p> <p>B1 area of $AXD = \text{area of } ABCD \div 4$</p> <p>B1 area of $CYZ = \text{area of } ABCD \div 8$</p> <p>A1 cao</p> <p>OR</p> <p>Diagram</p> <p>M1 for dividing left into 2 congruent triangles for dividing right into 4 congruent triangles</p> <p>B1 left = $2A$ and $2A$ or shaded = $\frac{1}{2}$ or $\frac{1}{2} = \frac{1}{4} = \frac{2}{8}$</p> <p>B1 right = $2A$ and A and A or shaded = $\frac{3}{4}$ of $\frac{1}{2} = \frac{3}{8}$</p> <p>A1 cao</p> <p>Substitution</p> <p>M1 for deciding upon suitable side lengths for AD and AB and calculating dimensions of internal shapes</p> <p>B1 for area of DZX</p> <p>B1 for area of $ZXBY$</p> <p>A1 cao</p> <p>OR</p> <p>M1 for deciding upon suitable side lengths for AD and AB and calculating dimensions of internal shapes</p> <p>B1 for area ADX</p> <p>B1 for area ZCY</p> <p>A1 cao</p>
Total for Question: 4 marks			



M20.

	Working	Answer	Mark	Additional Guidance
(a)		3.4×10^7	1	B1 cao
(b)	$2.4 \times 10^{12} \times \frac{5}{100} (\div 10^6)$	1.2×10^5	2	M1 $2.4 \times 10^{12} \times \frac{5}{100}$ oe $(\div 10^6)$ A1 cao
Total for Question: 3 marks				