St. Patrick's High School, Keady

Mathematics Department

GCSE Mathematics Practice Booklet

M3

Topic 1 – Number 1

Multiples and Factors

Indices, Powers and Roots

Accuracy and Bounds

Growth and Decay

Questions taken from CCEA Past Papers

Mark Scheme included at the end of this booklet

Q1

(a) Calculate the value of $\frac{2}{0.4^2}$

Answer _____ [2]

(b) Calculate the cube of 6

Answer _____ [1]

(c)

36	1	19	49	10	39	15	31

From the numbers in the list, write down all the

(i) prime numbers,

Answer _____ [1]

(ii) square numbers.

Answer _____ [1]

Q2 A number, expressed as a product of its prime factors, is $2^2 \times 3 \times 5^2$

(a) What is the number?

Answer _____ [1]

(b) **(i)** This number is multiplied by 9

Write the new number as a product of its prime factors.

Answer _____ [1]

(ii) Is this new number a square number?

You must explain your answer.

Answer _____ because _____

_____ [1]

Q3 Write 200 as a product of prime factors, using index notation.

Answer _____ [3]

Q4 **(a)** **(i)** Write 30 as a product of prime factors.

Answer 30 = _____ [1]

(ii) Write 22 as a product of prime factors.

Answer 22 = _____ [1]

(b) An airport bus leaves the city hall every 30 minutes.
A shuttle bus leaves the city hall every 22 minutes.
An airport bus and a shuttle bus both leave the city hall at 8.00 am.
At what time will an airport bus and a shuttle bus next leave the city hall at the same time?

Answer _____ [3]

Q5 Find the lowest common multiple (LCM) of 54 and 90

Answer _____ [2]

Q6 Write 600 as a product of prime factors.

Express your answer in index notation.

Answer _____ [3]

Q7 **(a)** Write 200 as a product of its prime factors.

Give your answer in index notation.

Answer _____ [3]

(b) Hence find the smallest number you can multiply 200 by to make a cube number.

Answer _____ [1]

Q8 Amy, Bronagh and Ciara did a Maths test in school.
The total for the test was 80 marks.

Amy got 50 marks out of 80
Bronagh got 65%
Ciara got $\frac{3}{5}$ of the 80 marks.

Who got the highest mark?
You must show all your working.

Answer _____ [4]

Q9 The volume of oil in a tank **decreases** by 5% every hour.
At 11am there are 9000 litres of oil in the tank.
What will the volume of oil be at 2pm?

Answer _____ litres [3]

Q10 In a group of golfers there are 37 males and 23 females.
19 of the males are wearing glasses and 14 of the females are wearing glasses.
What percentage of the group are wearing glasses?

Answer _____ % [3]

Q11 A box contains 560 g of cornflakes.

A box on special offer contains an extra 35% of cornflakes.

How many grams of cornflakes are in the special offer box?

Answer _____ g [3]

Q12 **(a)** What percentage is £35.25 of £47?

Answer _____ % [2]

(b) John bought a new phone for £44 plus 17.5% VAT.

Mark bought a similar phone in a different shop.

Mark paid £50.31 including VAT at 17.5%

Whose phone was more expensive and by how much?

Show all your working.

Answer _____ by £ _____ [3]

Q13 A tracksuit normally cost £75

(a) In a sale the price was reduced by 15%

Calculate the sale price of the tracksuit.

Answer £ _____ [3]

(b) The following week the shop displayed this sign.

FINAL STOCK CLEARANCE
A FURTHER 20% OFF ALL SALE PRICES

Show that the tracksuit now costs £51

[2]

(c) Rhys says, "I am getting 15% off, then 20% off, so I am getting 35% off the £75."

Is he correct?

You must show working to explain your answer.

Answer _____ because _____

_____ [2]

Q14 Eleven pencils each measuring 13 cm, to the nearest cm, in length are placed end to end.

Find the shortest possible total length and longest possible total length of the pencils.

Shortest length _____ cm [1]

Longest length _____ cm [1]

Q15 16 buckets each hold 8 litres, to the nearest litre.
Find the largest and smallest total volume of the 16 buckets.
Explain your reasoning clearly.

[3]

Q16 Larry and Jake each measure the length of a different slug. They both say that their slug is 6 cm to the nearest centimetre. Does this mean that both slugs are exactly the same length?

Explain your answer clearly.

_____

_____ [2]

Q17 Yasmin draws a rectangle measuring 2 cm by 4 cm (both to the nearest cm).

She says the area must be 8 cm^2 to the nearest cm^2

Explain why she is wrong.

[2]

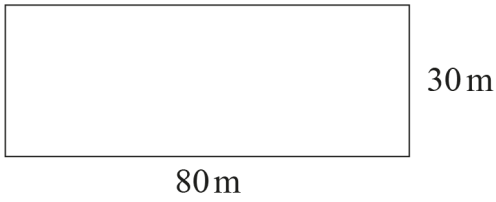
Q18

The length of the side of a square is 8.3cm, correct to 1 decimal place.

Work out the lower bound for the area of the square.

Answer _____ cm^2 [2]

Q19 A rectangle has been recorded as having a length of 80 m, correct to the nearest 10 m, and a width of 30 m, correct to the nearest m.



Jane says the area could be 2400 m^2

Steve says the area could be 1875 m^2

Paula says the area could be 2212.5 m^2

Which of the three is definitely not correct and what mistake has been made?

Explain your reasoning clearly.

[2]

Q20 Marie gets a basic monthly salary of £560 plus a commission of 22% of her sales that month.
In April her total salary was £3299
Work out her sales in April.

Answer £ _____ [3]

Q21 A bed has a sale price of £257.40
This is a saving of 22% on the original price.

What was the original price of the bed?

Answer £ _____ [3]

Q22 Gillian sold her formal dress online for £130.50
This was one-eighth more than the cost price of the dress.
What was the cost price?

Answer £ _____ [3]

Q23 Over a year a car decreased in value from £12 500 to £10 500

Calculate the percentage decrease.

Answer _____ % [3]

Q24 A special offer shampoo bottle contains 20% extra.

It contains 900 ml of shampoo.

How much shampoo was in the original bottle?

Answer _____ ml [3]

Q25 The temperature in a desert fell to 10ºC during a twelve hour period.

This represented an 80% decrease.

Calculate the temperature at the beginning of the twelve hour period.

Answer _____ºC [3]

Q26 The population of a town in 2014 was 80 058

This was a 65% increase on its population in 1994

What was the population in 1994?

Answer _____ [3]

Q27 Peter, Jack and Colin share a flat. They pay the rent monthly.

Peter pays 30% of the monthly rent.

Jack pays $\frac{3}{8}$ of the monthly rent.

Colin pays £520 of the monthly rent.

Calculate the total monthly rent for the flat.

Answer £ _____ [5]

Q28

A restaurant bill, including 15% service charge, was £98.90
How much was the service charge?

Answer £ _____ [3]

Q29

James can throw a javelin 49 metres.

His target is to throw it 4% further each year.

If he stays on target, how many years will it be before he can throw the javelin 55 metres?

You must show working to justify your answer.

Answer _____ years [4]

Q30 After a 7.5% pay rise Mr Jones' salary was £29 455

What was his salary before the pay rise?

Answer £ _____ [3]

1.

(a) Sight of 0.16 MA1

12.5 A1

(b) 216 A1

(c) **(i)** 19, 31 and no others A1

(ii) 36, 1, 49 and no others A1

2.

(a) 300 A1

(b) **(i)** $2^2 \times 3^3 \times 5^2$ A1

(ii) No because not all the prime factors are squared A1
or alternative
No because 2700 is not a square number

3.

$200 = 2 \times 2 \times 2 \times 5 \times 5$ M1 A1

$2^3 \times 5^2$ A1

4.

(a) **(i)** $30 = 5 \times 3 \times 2$ A1

(ii) $22 = 11 \times 2$ A1

(b) using LCM of 30 and 22 M1
$11 \times 5 \times 3 \times 2 = 330$ minutes $= 5.5$ hours A1
1.30pm A1

5.

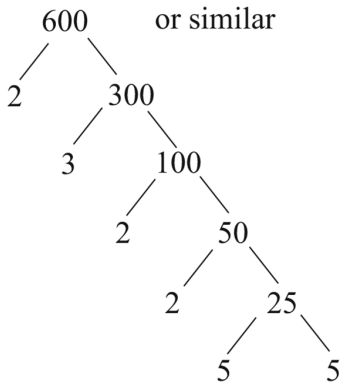
$54 = 2 \times 3 \times 3 \times 3$ and $90 = 2 \times 3 \times 3 \times 5$ MA1
270 A1

6.

2	600
2	300
2	150
3	75
5	25
	5

or

5	600
5	120
3	24
2	8
2	4
	2



or similar

M1 A1

$2^3 \times 3 \times 5^2$ MA1

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7. **(a)** Correct method used M1

$2 \times 2 \times 2 \times 5 \times 5$ A1

$2^3 \times 5^2$ A1

(b) 5 (gives 1000) A1

8.

			Alternative		
Bronagh	$\frac{65}{100} \times 80$	C1	Amy	$\frac{50}{80} \times 100\%$	C1
Ciara	$80 \div 5 \times 3$	C1	Ciara	$\frac{3}{5} \times 100\%$	C1
52 and 48 marks both correct		C1	62.5% and 60% both correct		C1
Bronagh		C1	Bronagh		C1

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9. 8550 MA1

8122.5 MA1

7716.375 (accept 7716) or (7716.38) or (7716.4) MA1

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10. $\frac{33}{60}$ MA1

$\frac{33}{60} \times 100 = 55\%$ M1 A1

11.

$560 \times \frac{35}{100}$	M1
196	A1
756	MA1

12.

(a)	$\frac{35.25}{47} \times 100$	MA1
	$= 75\%$	A1
(b)	John's phone $\frac{17.5}{100} \times 44$	MA1
	$= £7.70$	
	John's phone cost £51.70	MA1
	John's phone is dearer by £51.70 – £50.31 = £1.39	MA1

13.

(a)	15% of 75 = 11.25	MA1
	75 – 11.25	MA1
	63.75	A1
(b)	20% of 63.75 = 12.75	MA1
	63.75 – 12.75 = 51	A1
(c)	35% of 75 = 26.25 or 75 – 26.25 = 48.75	MA1
	No, not equal to 51	A1

14.

Shortest	137.5	A1
Longest	148.5	A1

15.

Clear explanation of bounds between 7.5 and 8.5	C1
Smallest volume = 16 × 7.5 = 120 litres	C1
Largest volume = 16 × 8.5 = 136 litres	C1

16.

Since they are measured to the nearest cm then they could measure anything from 5.5 cm to 6.5 cm and so they are not necessarily the same length.
(or similar explanation) C2

17.

Could be 1.5 × 3.5 = 5.25

or could be 2.5 × 4.5 = 11.25

or suitable values given, not rounding to 8 M1 A1

18.

8.25 as lower bound	MA1
8.25 × 8.25 = 68.0625 (no further rounding)	MA1

19.

Max area = 85 × 30.5 = 2592.5 Min area = 75 × 29.5 = 2212.5	MA1
Steve not correct as outside range	MA1

Alternative solution

Jane 80 × 30 = 2400 is acceptable Paula 75 × 29.5 = 2212.5 is acceptable	MA1
Steve 75 × 25 = 1875 is not acceptable as lower bound for width is 29.5 not 25	MA1

20.

3299 – 560 = 2739	C1
2739 = 22%	C1
12 450	C1

21.

78% = 257.40	MA1
257.40 ÷ 0.78 = 330	M1 A1

22.

9/8 = £130.50 **or** 112.5% = £130.50	MA1
130.50/9 (× 8) **or** 130.50/112.5 (× 100) **or** 14.50 **or** 1.16	MA1
= £116	A1

23.

12500 – 10500 = 2000	MA1
$\frac{2000}{12500} \times 100$	MA1
16%	A1

24.

900 ml = 120%	MA1
$\frac{900}{120} \times 100 = 750$	MA1 A1

25.

20% = 10 °C	MA1
1% = 0.5 °C	A1
100% = 50 °C	A1

26.

$165\% = 80058$	MA1
$1\% = \frac{80058}{165} = 485.2$	MA1
$100\% = 48520$	A1

27.

Peter + Jack = 67.5% (or 27/40) (or 0.675)	MA1
Colin = 32.5% (or 13/40) (or 0.325)	A1
32.5% = £520	M1
1% = £16	MA1
100% = £1600	MA1

28.

115% = £98.90	MA1
1% = £0.86 (or 100% = £86)	MA1
15% = £12.90 (£98.90 – £86)	MA1

29.

$49 \times 1.04 = 50.96$	MA1
$49 \times 1.04^2 = 52.998\ldots$ or equivalent method	MA1
$49 \times 1.04^3 = 55.118\ldots$ or equivalent method	MA1
3	A1

30.

107.5% = 29455	MA1
(100%) = 29455 ÷ 107.5 × 100	MA1
= £27400	A1

Alternative Solution

(100%) = 29455 ÷ 1.075	M1 A1
= £27400	A1