

8300

GCSE MATHEMATICS

Foundation and Higher tier – Questions by Topic

Number

Calculating with roots and powers (non-calculator)

v1.0

Name _____

Materials

For this paper you must have:

- Mathematical instruments
- You must not use a calculator



Information

- The marks for questions are shown in brackets

Advice

- In all calculations, show clearly how you work out your answer

Questions 1 to 28 are **foundation** tier only

Q1.

Write down the value of 2^3

(Total 1 mark)

Q2.

Work out 10^3

(Total 1 mark)

Q3.

Write down the value of $\sqrt{49}$

(Total 1 mark)

Q4.

Work out $(-8)^2$

(Total 1 mark)

Q5.

Work out the value of 2^4

(Total 1 mark)

Q6.

(a) Write down the value of $\sqrt{100}$

(1)

(b) Write down the value of 13^2

(1)

(Total 2 marks)

Q7.

Write down the value of $\sqrt{144}$

(Total 1 mark)

Q8.

(a) Show that 125 is a cube number.

(1)

(b) $125 = a + b$

a and b are square numbers.

Find **two** possible pairs of values for a and b .

(2)

(Total 3 marks)

Q9.

(a) Circle the cube number.

25 27 31 32 44 45

(1)

(b) Circle the prime number.

25 27 31 32 44 45

(1)

(c) Circle a number that is a factor of 900

25 27 31 32 44 45

(1)

(Total 3 marks)

Q10.

Write down the value of 3^2

(Total 1 mark)

Q11.

Complete this table.

3^0	3^1	3^2	3^3	3^4	3^5	3^6	3^7
1	3	9			243	729	2187

(Total 2 marks)

Q12.

Work out the value of 3^3

(Total 1 mark)

Q13.

(a) Circle the value of 2^4

6

8

16

24

(b) Circle the value of 5^3

(1)

(c) Circle the value of $\sqrt{196}$

15

25

53

125

(1)

13

14

16

98

(1)

(Total 3 marks)

Q14.

(a) Work out the value of 2^3

(1)

(b) Work out the value of 10^4

(1)

(c) Work out the value of $\sqrt{144}$

(1)

(Total 3 marks)

Q15.

Circle the value of 5^3

8

15

25

125

(Total 1 mark)

Q16.

(a) Work out $5^2 \times 2^3$

(2)

(b) Write down the value of $\sqrt{144}$

(1)

(c) Write down the cube root of 64.

(1)

(Total 4 marks)

Q17.

Here are some properties of numbers.

- A Even
- B Odd
- C Prime
- D Square
- E Two-digit

- (a) Which **two** properties does the number 4 have?
Circle the correct letters.

A B C D E

(1)

- (b) Can one number have **all** of the properties?
Tick a box.

☐

Yes

☐

No

☐

Cannot tell

Give a reason for your answer.

(1)

- (c) Write down a number with **three** of the properties.
State which properties it has.

(2)

(Total 4 marks)

Q18.

- (a) Write down the value of 10^3

(1)

- (b) Work out the value of 0.4×0.2

(1)

(Total 2 marks)

Q19.

Circle the value of $3^2 + 4^2$

14

17

25

49

(Total 1 mark)

Q20.

- (a) Write down the value of 5^3

(1)

- (b) Write down the value of $\sqrt{121}$

(1)

- (c) Between which **two** consecutive whole numbers does $\sqrt{40}$ lie?

(2)

(Total 4 marks)

Q21.

Work out the value of 1.5^2

(Total 2 marks)

Q22.

Here is a list of numbers.

14 9 20 29 3 45 33

- (a) Which number in the list is a multiple of 4 ? (1)
- (b) Which number in the list is a square number? (1)
- (c) Which **two** numbers in the list have a total of 43 ? (1)
- (d) Work out largest number in the list $\div$ smallest number in the list (1)
- (Total 4 marks)**

Q23.

- (a) Work out the value of $3^3 + 4^2$ (2)
- (b) Work out $5^3 - 10^2$. Give your answer as a power of 5. (3)
- (Total 5 marks)**

Q24.

- (a) Write the number one hundred thousand as a power of 10. (1)
- (b) Work out the value of $\frac{2^3 \times 5^2}{10}$ (3)
- (Total 4 marks)**

Q25.

Work out $\sqrt{100 - 4(2^2 + 5)}$ (Total 3 marks)

Q26.

$2 + 0 + 1 + 7 = 10$

Make the following calculations correct. Use only the symbols +, −, ×, ÷ and ()

2	0	1	7	=	−4
2	0	1	7	=	0
2	0	1	7	=	2^4

(Total 3 marks)

Q27.

- (a) Circle the **two** numbers that add up to 100
21 34 35 65 76 (1)
- (b) Circle the **two** numbers that are even.
21 34 35 65 76 (1)
- (c) The number 31 is 5 less than the square number 36
Circle the number that is 5 **less** than a square number.
21 34 35 65 76 (1)
- (d) Circle the number that is 5 **more** than a square number.
21 34 35 65 76 (1)
- (Total 4 marks)**

Q28.

- (a) The sum of two square numbers is 180
What are the **two** square numbers?

(2)

- (b) Kim says,

“The sum of any two **different** square numbers is **always** even.”

Is she correct?

Write down a calculation to support your answer.

(1)

(Total 3 marks)

Questions 29 to 34 are **higher** tier only

Q29.

Which one of these is a square number **and** a cube number?

Circle your answer.

100

1000

10 000

1 000 000

(Total 1 mark)

Q30.

Work out the value of $\left(\frac{3}{2}\right)^2$

Give your answer as a mixed number.

(Total 1 mark)

Q31.

Work out $12^2 \div \left(\frac{1}{3} \times \sqrt{36}\right)$

(Total 3 marks)

Q32.

$$x + y = 100$$

x is a square number.

y is a prime number.

Work out the values of x and y .

(Total 2 marks)

Q33.

$$N = 2a + b$$

a is a two-digit square number.

b is a two-digit cube number.

What is the **smallest** possible value of N ?

(Total 3 marks)

Q34.

a and b are different prime numbers less than 12.

Work out **three** pairs of numbers a and b such that $\sqrt{(2a+b)}$ is a whole number.

(Total 3 marks)