N18N19 Powers Indices Squares Cubes and their Roots

OCR

2 Write down

(a) a multiple of 12,

(a) .....**[1]**

(b) a square number between 20 and 40.

(b) .....**[1]**

2 Write down

(a) a multiple of 12,

12 or 24, or 36....

(a) 24 **[1]**

(b) a square number between 20 and 40.

$5^2 = 25$

$6^2 = 36$

(b) 25 or 36 **[1]**

15 **(a)** 12 is one factor of the integer N.

Write down two other factors of N.

(a) ..... and ..... **[1]**

(b) The integer S is a square number.

Explain why S cannot be a prime number.

.....

.....**[1]**

Created by W Neill

15 **(a)** 12 is one factor of the integer N. → whole number

Write down two other factors of N.

1	12
2	6
3	4

12

24

12

(a) 3 and 4 **[1]**

(b) The integer S is a square number.

Explain why S cannot be a prime number.

Prime

1 itself

49

1 7 49

Square number must have at least 3 factors, so it can't be prime **[1]**

6 Here is a list of numbers.

24 25 26 27 28 29 30 31

From this list, write down

(a) a multiple of 7,

(a) ..... **[1]**

(b) a cube number,

(b) ..... **[1]**

(c) a prime number.

(c) ..... **[1]**

6 Here is a list of numbers.

24 25 26 27 28 29 30 31

From this list, write down

(a) a multiple of 7,

(a) 28 **[1]**

(b) a cube number,

(b) 27 ... 3x3x3 **[1]**

(c) a prime number.

(c) 29 or 31 **[1]**

7 **(a)** Work out.

(i) 11^2

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

(ii) $\sqrt{400}$

(ii) ..... **[1]**

(b) Simplify.

$m^2 \times m^6$

(b) ..... **[1]**

7 **(a)** Work out.

(i) 11^2

11 x 11

(a)(i) 121 [1]

(ii) $\sqrt{400}$

_ x _ = 400
20 20

(ii) 20 or -20 [1]

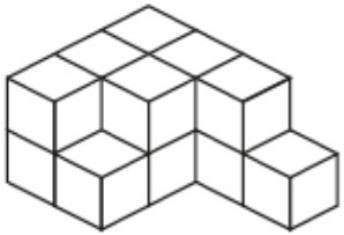
(b) Simplify.

$m^2 \times m^6$

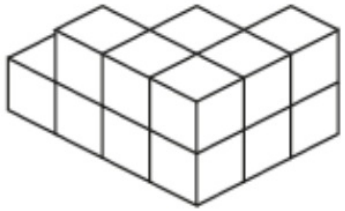
(b) m^8 [1]

Created by W Neill

18 The diagram shows two views of a solid made from 14 one-centimetre cubes.



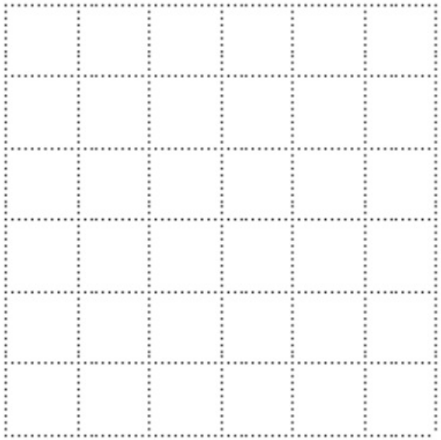
Front view



Rear view

Not to scale

(a) On the centimetre grid below, draw a plan of the solid.



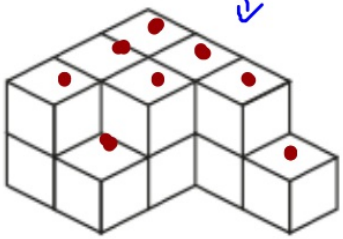
[2]

(b) Work out the **smallest** number of cubes that need to be added to the solid to make a cube.

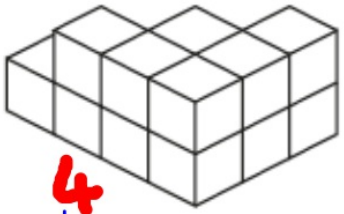
(b) ..... **[2]**

Created by W Neill

18 The diagram shows two views of a solid made from 14 one-centimetre cubes.

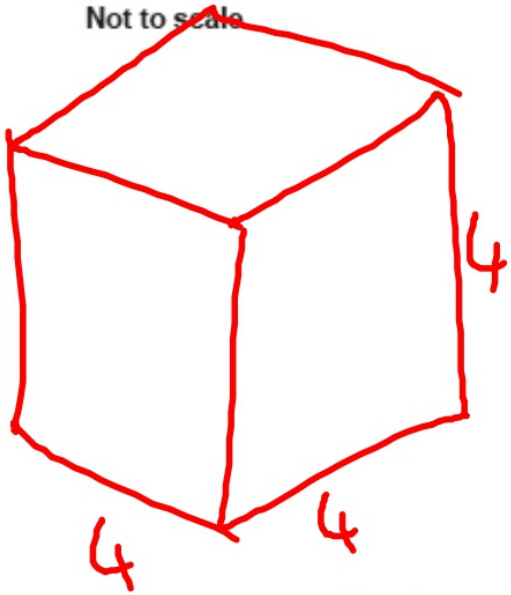


Front view

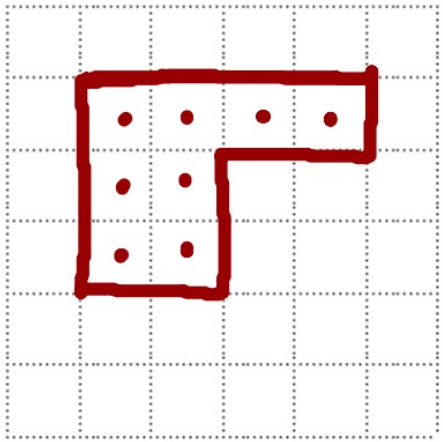


Rear view

Not to scale



(a) On the centimetre grid below, draw a plan of the solid.



[2]

4x4x4

$= 64cm^3$

(b) Work out the **smallest** number of cubes that need to be added to the solid to make a cube.

64 - 14

(b) 50 ..... [2]

Video created by W Neill

3 Here is a list of numbers.

11 27 81 21 41 42 23 39 45

From this list, write down

(a) the even number,

(a) ..... **[1]**

(b) the square number,

(b) ..... **[1]**

(c) all the prime numbers.

(c) ..... **[2]**

Video created by W Neill

3 Here is a list of numbers.

3 9 9x9 3 7 3 13

11 ✓ 27 ✗ 81 ✗ 21 ✗ 41 ✓ 42 ✗ 23 ✓ 39 ✗ 45 ✗

From this list, write down

(a) the even number,

(b) the square number,

3 x 3 = 9

(c) all the prime numbers.

(a) 42 ..... **[1]**

(b) 81 ..... **[1]**

(c) 11, 23 and 41 ..... **[2]**

Video created by W Neill

8 **(a)** Evaluate.

(i) $\sqrt{121}$

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

(ii) 4^{-2}

(ii) ..... **[1]**

(b) Work out.

$(9-3\times2)^2$

(b) ..... **[2]**

(c) Fill in the power.

$5^{\square} = 125$ **[1]**

Video created by W Neill

8 **(a)** Evaluate.

(i) $\sqrt{121}$ $\_ \times \_ = 121$

(a)(i) 11 [1]

(ii) 4^{-2} $\frac{1}{4^2} =$

(ii) $\frac{1}{16}$ [1]

(b) Work out.

B✓ $(9-3\times2)^2$ $(9-6)^2$

I✓

D

M✓ 3^2

A

S

(b) 9 [2]

(c) Fill in the power.

$5^{\boxed{3}} = 125$ $5\times5\times5=125$ [1]

Video created by W Neill

3 **(a)** Find the value of y.

$$5 \times 5 \times 5 \times 5 \times 5 \times 5 \times 5 = 5^y$$

(a) $y =$ ..... **[1]**

(b) Find the values of z.

$$z^2 = 196$$

(b) $z =$ ..... or $z =$ ..... **[2]**

Video created by W Neill

3 **(a)** Find the value of y.

$$5 \times 5 \times 5 \times 5 \times 5 \times 5 \times 5 = 5^y$$

5^7

(a) $y =$ 7 ✓ **[1]**

(b) Find the values of z.

$$z^2 = 196$$

$14 \times 14 = 196$

$-14 \times -14 = 196$

$z = \sqrt{196}$

(b) $z =$ 14 or $z =$ −14 **[2]**

Created by W Neill

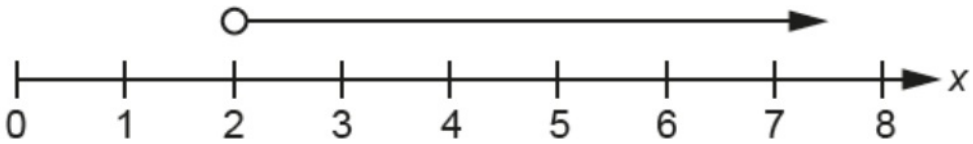
4 **(a)** Use one of these symbols <, > or = to make each statement true.

(i) $\frac{1}{4}$ ..... 0.25 **[1]**

(ii) 0.66 ..... $\frac{2}{3}$ **[1]**

(iii) 6 ..... 2^3 **[1]**

(b) Write down the inequality for x that is shown on this number line.



(b) ..... **[1]**

Created by W Neill

4 **(a)** Use one of these symbols <, > or = to make each statement true.

(i) $\frac{1}{4}$ ..... 0.25 **[1]**

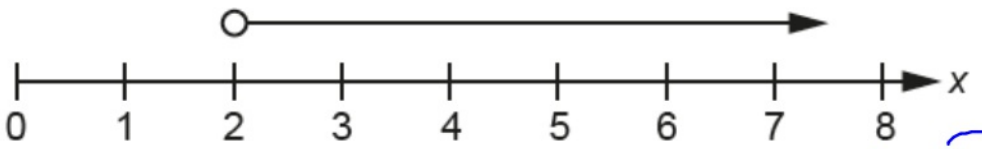
(ii) 0.66 ..... $\frac{2}{3}$ **[1]**

$\frac{2}{3} = 0.6666$ is bigger than 0.66

(iii) 6 ..... 2^3 **[1]**

$2^3 = 8$

(b) Write down the inequality for x that is shown on this number line.



(b) $x > 2$ ..... **[1]**

(b) Evaluate.

(i) 2^5

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

(ii) $\sqrt{400}$

(ii) ..... **[1]**

Created by W Neill

(b) Evaluate.

(i) 2^5

$2 \times 2 \times 2 \times 2 \times 2 =$

(b)(i) 32 **[1]**

(ii) $\sqrt{400}$

$20 \times 20 = 400$

(ii) 20 or -20 **[1]**

$-20 \times -20 = +400$

Created by W Neill

17 Andrew is thinking of a number.

- It is between 1 and 150.
- It is one more than a square number.
- It is three less than a cube number.
- It is not a prime number.

What is Andrew's number?
You must show all your reasoning.

..... **[4]**

Created by W Neill

17 Andrew is thinking of a number.

- It is between 1 and 150.
- It is one more than a square number.
- It is three less than a cube number.
- It is not a prime number.

What is Andrew's number?
You must show all your reasoning.

Square 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144

5 122

Cube ... 1, 8, 27 64 125

5 24 61 122

5 is prime

122 ✓

..... **[4]**

4 **(a)** Fill in each missing number.

(i) 24 – ..... = 36 **[1]**

(ii) $\sqrt{}$ ..... = 16 **[1]**

(b) The length of a line is 10.4 cm, correct to 1 decimal place.

Write down the shortest possible length of the line.

(b) ..... cm **[1]**

4 **(a)** Fill in each missing number.

(i) $24 - \ldots\ldots = 36$ **[1]**

-12

$24 + 12 = 36$

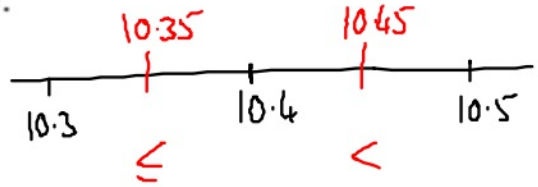
(ii) $\sqrt{\ldots\ldots} = 16$ **[1]**

$\sqrt{256}$

$\sqrt{?} = 16 \quad \ldots 16^2$

(b) The length of a line is 10.4 cm, correct to 1 decimal place.

Write down the shortest possible length of the line.



longest → 10.45

10.4

smallest → 10·35

(b) 10·35 cm **[1]**

10 **(a)** Write $7 \times 7 \times 7 \times 7$ as a power of 7.

(a) ..... **[1]**

(b) Complete this working to write 4^3 as a power of 2.

$4^3 = 4 \times 4$ .....

so $4^3 = 2 \times 2 \times 2 \times$ .....

so $4^3 =$ ..... **[2]**

(c) Write these numbers in order, starting with the largest.

8.1×10^1 1.02×10^3 9.83×10^{-2} 3×10^2

(c) ..... , ... , ... , ... **[1]**

largest

Created by W Neill

10 **(a)** Write $7 \times 7 \times 7 \times 7$ as a power of 7.

(a) 7^4 **[1]**

(b) Complete this working to write 4^3 as a power of 2.

$4^3 = 4 \times 4 \times 4 = 64$

so $4^3 = 2 \times 2 \times 2 \times 2 \times 2 \times 2$

so $4^3 = 2^6$ **[2]**

(c) Write these numbers in order, starting with the largest. ✓

8.1×10^1 $\quad$ 1.02×10^3 $\quad$ 9.83×10^{-2} $\quad$ 3×10^2

81 $\quad$ 1020 $\quad$ 0.0983 $\quad$ 300

(c) 1.02×10^3, 3×10^2, 8.1×10^1, 9.83×10^{-2} **[1]**

largest

Created by W Neill

1 Here is a list of numbers.

2 8 5 12 6

(a) From this list, write down

(i) the odd number,

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

(ii) the cube number.

(ii) ..... **[1]**

Created by W Neill

1 Here is a list of numbers.

2 8 5 12 6

(a) From this list, write down

(i) the odd number,

5

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

N19 **(ii)** the cube number.

1 x 1 x 1 = 1
2 x 2 x 2 = 8
3 x 3 x 3 = 27

8

(ii) ..... **[1]**

Created by W Neill

3 **(a)** Work out.

N18 **(i)** 10^3

(a)(i) ..... **[2]**

(ii) $9(8 - 3 \times 2)$

N29

(ii) ..... **[2]**

Created by W Neill

3 **(a)** Work out.

N18 **(i)** 10^3

10x10x10 =

(a)(i) 1000 ..... **[2]**

(ii) $9(8 - 3 \times 2)$

N29

9(8-6)

9(2)

mult

(ii) 18 ..... **[2]**

Created by W Neill

2 **(a)** Write down.

(i) 3091 rounded to the nearest hundred

N25

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

(ii) 3% as a decimal

N46

(ii) ..... **[1]**

(iii) the cube root of 27

N19

(iii) ..... **[1]**

Created by W Neill

2 **(a)** Write down.

(i) 3091 rounded to the nearest hundred

N25

(a)(i) 3100 ..... **[1]**

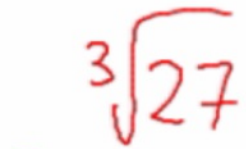
(ii) 3% as a decimal

N46

(ii) 0.03 ..... **[1]**

(iii) the cube root of 27

N19



3 x 3 x 3 = 27

(iii) 3 ..... **[1]**

Created by W Neill

20 (a) Show that $a^5 \times (a^3)^2$ can be expressed as a^{11}. **[2]**

N18

20 (a) Show that $a^5 \times (a^3)^2$ can be expressed as a^{11}. **[2]**

N18

$(a^3)^2$ ... mult indices a^6

$a^5 \times a^6 = a^{11}$ ... as you add indices

(b) Write $\frac{1}{125} \times 25^9$ as a power of 5.

N18
N54H

(b) ..... **[3]**

Created by W Neill

(b) Write $\frac{1}{125} \times 25^9$ as a power of 5.

N18
N54H

$\frac{1}{125} = 125^{-1}$

$(5^3)^{-1}$

$= 5^{-3}$

25^9

$(5^2)^9$

5^{18}

$5^{-3} \times 5^{18} = 5^{15}$

5^{15} ✓

(b) ..... **[3]**

4 **(a)** Write down each of the following.

(i) An even number.

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

(ii) A factor of 25.

N17

(ii) ..... **[1]**

(iii) A prime number between 10 and 20.

N17

(iii) ..... **[1]**

(iv) A cube number.

N19

(iv) ..... **[1]**

4 **(a)** Write down each of the following.

(i) An even number.

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

(ii) A factor of 25.

N17

(ii) ..... **[1]**

(iii) A prime number between 10 and 20.

N17

(iii) ..... **[1]**

(iv) A cube number.

N19

(iv) ..... **[1]**

7 **(a)** Write down the value of $\sqrt[3]{27}$.

N19

(a) ..... **[1]**

(b) Work out 7^2.

N19

(b) ..... **[2]**

(c) Write 6^{-1} as a fraction.

N54

(c) ..... **[1]**

Video created by Will Neill

7 **(a)** Write down the value of $\sqrt[3]{27}$.

N19

$3 \times 3 \times 3 = 27$

3

(a) ..... **[1]**

(b) Work out 7^2.

N19

7×7

49

(b) ..... **[2]**

(c) Write 6^{-1} as a fraction.

N54

$\frac{1}{6}$

(c) ..... **[1]**

Video created by W Neill

4 Tia thinks of a number.
She finds the square root and subtracts 4.
A16 Her answer is 1.
N19

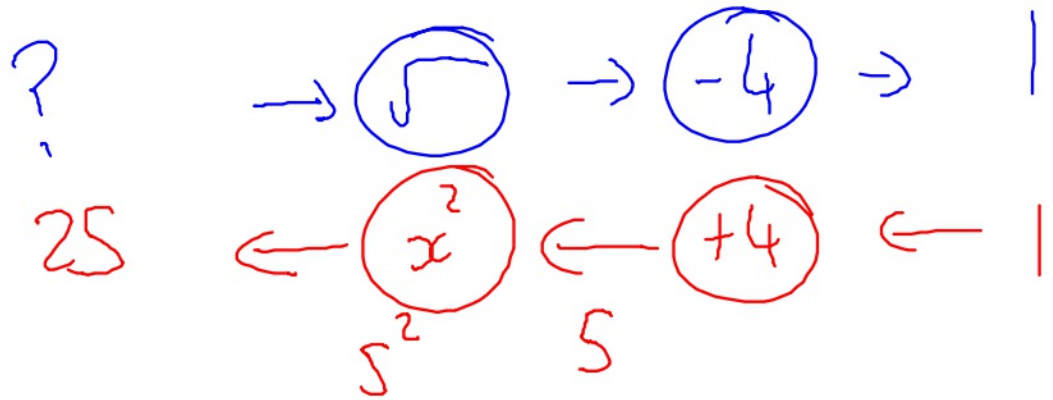
What number is she thinking of?

..... **[2]**

Video created by W Neill

4 Tia thinks of a number.
She finds the square root and subtracts 4.
A16 Her answer is 1.
N19

What number is she thinking of?



25

..... **[2]**

13 **(a)** Work out 2^4.

N18

(a) ..... **[2]**

(b) Find the value of n.

$$100 = 4 \times 5^n$$

N18

(b) $n =$ ..... **[2]**

Video created by W Neill

13 **(a)** Work out 2^4.

N18

$2 \times 2 \times 2 \times 2$

(a) 16 **[2]**

(b) Find the value of n.

$100 = 4 \times 5^n$

N18

$100 = 4 \times 25$

$5^2 = 25$

$5^0 = 25$

(b) $n =$ 2 **[2]**

Created by W Neill

4 **(a)** Factorise.

A33 $x^2 - 43^2$

(a) ..... **[1]**

(b) Calculate.

$57^2 - 43^2$

(b) ..... **[2]**

Created by W Neill

4 **(a)** Factorise.

A33 $x^2 - 43^2$

$(x+43)(x-43)$

(a) ..... **[1]**

(b) Calculate.

$57^2 - 43^2$

$(57+43)(57-43)$

$(100)(14)$

1400

57 × 57 = 399, 2850, 3249

43 × 43 = 129, 1720, 1849

3249 − 1849 = 1400

(b) 1400 **[2]**

(ii) The number C is written as the product of its prime factors.

N18 $C = 2^3 \times 3 \times 5^2$

Work out $P \div C$, leaving your answer as a product of powers of prime numbers.

(ii) ..... **[2]**

(ii) The number C is written as the product of its prime factors.

N18 $C = 2^3 \times 3 \times 5^2$

Work out $P \div C$, leaving your answer as a product of powers of prime numbers.

$\frac{P}{C}$ $\frac{2^5 \times 3^2 \times 5^3 \times 11}{2^3 \times 3^1 \times 5^2}$

(ii) $2^2 \times 3 \times 5 \times 11$ ..... **[2]**

Edexcel

20 (a) Write $\frac{3^5 \times 3^4}{3^2}$ as a power of 3

.....

(2)

(b) Write down the value of 12^0

.....

(1)

(c) Write down the value of 3^{-2}

.....

(1)

Created by W Neill

20 (a) Write $\frac{3^5 \times 3^4}{3^2}$ as a power of 3

$\frac{3^9}{3^2} =$ 3^7

.....

(2)

(b) Write down the value of 12^0

1

.....

(1)

(c) Write down the value of 3^{-2}

$\frac{1}{3^2} = \frac{1}{9}$

.....

(1)

2 Here is a list of numbers.

10 16 21 28 43

One of these numbers is a power of 2

Which number?

.....

(Total for Question 2 is 1 mark)

Created by W Neill

2 Here is a list of numbers.

10 16 21 28 43

One of these numbers is a power of 2

Which number?

$4^2 = 16$

16

(Total for Question 2 is 1 mark)

6 Here is a list of numbers.

11 15 22 37 49 63 75

From the numbers in the list,

(a) write down an even number

.....

(1)

(b) write down a multiple of 9

.....

(1)

(c) write down a square number.

.....

(1)

(Total for Question 6 is 3 marks)

6 Here is a list of numbers.

11 15 22 37 49 63 75

From the numbers in the list,

(a) write down an even number

0 2 4 6 8

22

(1)

(b) write down a multiple of 9

9, 18, 27, 36, 45, 54, 63

63

(1)

(c) write down a square number.

7^2

49

(1)

(Total for Question 6 is 3 marks)

Video created by W Neill

1 Work out the value of 2^4

.....

(Total for Question 1 is 1 mark)

Video created by W Neill

1 Work out the value of 2^4

$2 \times 2 \times 2 \times 2$ 16

(Total for Question 1 is 1 mark)

Video created by W Neill

8 Here is a list of numbers.

21 22 23 24 25 26 27 28 29

(a) From the numbers in the list, write down a square number.

.....

(1)

(b) From the numbers in the list, write down a number that is a multiple of **both** 4 and 6

.....

(1)

(c) Write down all the prime numbers in the list.

Video created by W Neill

8 Here is a list of numbers.

21 22 23 24 25 26 27 28 29

3 7

(a) From the numbers in the list, write down a square number.

$3 \times 3 = 9$ ✓ $5 \times 5 = 25$ 25

(1)

(b) From the numbers in the list, write down a number that is a multiple of **both** 4 and 6

24

(1)

(c) Write down all the prime numbers in the list.

15 × 1 3 5 15

1 7

23 and 29 ✓

21 $p^3 \times p^x = p^9$

(a) Find the value of x.

$x =$ .....

(1)

$(7^2)^y = 7^{10}$

(b) Find the value of y.

$y =$ .....

(1)

Created by W Neill

21 $p^3 \times p^x = p^9$

(a) Find the value of x.

$3 + 6 = 9$

$x =$ 6

(1)

$(7^2)^y = 7^{10}$

(b) Find the value of y.

$2 \times \square = 10$

$y =$ 5

(1)

9 Nidah writes down two different prime numbers.

She adds together her two numbers.
Her answer is a square number less than 30

Find two prime numbers that Nidah could have written down.

..... , ...

(Total for Question 9 is 2 marks)

Created by W Neill

9 Nidah writes down two different prime numbers.

She adds together her two numbers.
Her answer is a square number less than 30

Find two prime numbers that Nidah could have written down.

Prime Numbers ... 2, 3, 5, 7, 11, 13, 17, 19, 23

Square Numbers ... 1, 4, 9, 16, 25, ~~36~~

2 and 7 = 9 ✓
3 and 13 = 16 ✓
5 and 11 = 16 ✓
2 and 23 = 25 ✓

..... , ...

(Total for Question 9 is 2 marks)

Video created by W Neill

3 Work out the value of 3^5

N18

.....

(Total for Question 3 is 1 mark)

Video created by W Neill

3 Work out the value of 3^5

N18

$3 \times 3 \times 3 \times 3 \times 3$

243

(Total for Question 3 is 1 mark)

Video Created by W Neill

5 (a) Work out $3 \times 5 + 7$

N29

.....

(1)

(b) Work out 2^3

N19

.....

(1)

(c) Write brackets ( ) in this statement to make it correct.

N29

$$7 \times 2 + 3 = 35$$

(1)

(Total for Question 5 is 3 marks)

Video Created by W Neill

5 (a) Work out $3 \times 5 + 7$

N29

15+7

22

(1)

(b) Work out 2^3

N19

2x2x2

8

(1)

(c) Write brackets ( ) in this statement to make it correct.

N29

$7 \times (2 + 3) = 35$ ✓

7x5 =35

(1)

(Total for Question 5 is 3 marks)

Video Created by W Neill

20 Work out the value of $\dfrac{3^7 \times 3^{-2}}{3^3}$

N18

.....

(Total for Question 20 is 2 marks)

Video Created by W Neill

20 Work out the value of $\dfrac{3^7 \times 3^{-2}}{3^3}$

N18

$3^7 \times 3^{-2}$ ... add indices

$7 + -2$

$7 - 2 = 5$

$\dfrac{3^5}{3^3}$ .... subtract indices

$5 - 3 = 2$

$3^2 = 9$ ✓

(Total for Question is 2 marks)

Video Created by W Neill

2 Write down a square number that is also an odd number.

N19

.....

(Total for Question 2 is 1 mark)

Video Created by W Neill

2 Write down a square number that is also an odd number.

N19

9

.....

(Total for Question 2 is 1 mark)

$1^2 = 1 \times 1 = 1$

$2^2 = 2 \times 2 = 4$

$3^2 = 3 \times 3 = 9$

Video Created by W Neill

4 Work out the cube root of 64

N19

.....

(Total for Question 4 is 1 mark)

Video Created by W Neill

4 Work out the cube root of 64

N19

$\sqrt[3]{64}$

4

(Total for Question 4 is 1 mark)

Video Created by W Neill

3 Find $\sqrt{1.44}$

N19

.....

(Total for Question 3 is 1 mark)

Video Created by W Neill

3 Find $\sqrt{1.44}$

N19

$\frac{6}{5}$ or 1.2 ✓

(Total for Question 3 is 1 mark)

AQA

Video created by W Neill

14 A number is picked at random from the first four **prime** numbers.

A number is picked at random from the first four **square** numbers.

The two numbers are added to get a score.

14 (a) Complete the table.

[4 marks]

N17
N19

Square numbers

+	1	4	9	
2				
3			12	
7				

Prime numbers

14 (b) What is the probability that the score is a **prime** number? **[1 mark]**

P21

Answer _____

Video created by W Neill

14 A number is picked at random from the first four **prime** numbers.

A number is picked at random from the first four **square** numbers.

The two numbers are added to get a score.

14 (a) Complete the table.

[4 marks]

N17
N19

		Square numbers			
		1x1	2x2	3x3	4x4
	+	1	4	9	16
Prime numbers	2	3	6	11	18
	3	4	7	12	19
	5	6	9	14	21
	7	8	11	16	23

14 (b) What is the probability that the score is a **prime** number?

[1 mark]

P21

Answer $\frac{6}{16} = \frac{3}{8}$ ✓

Video created by W Neill

4 Circle the value of 2^5

[1 mark]

N18

10 25 32 64

Video created by W Neill

4 Circle the value of 2^5

[1 mark]

N18

10 25 32 64

$2 \times 2 \times 2 \times 2 \times 2$

Video created by W Neill

15 Show that there are **exactly** five 3-digit cube numbers.

[3 marks]

N19

Video created by W Neill

15 Show that there are **exactly** five 3-digit cube numbers.

[3 marks]

N19

$1^3 = 1$

$2^3 = 8$

$3^3 = 27$

$4^3 = 64$

$5^3 = 125$

$6^3 = 216$

$7^3 = 343$

$8^3 = 512$

$9^3 = 729$

$10^3 = 1000$

$11^3 > 1000$

Video created by W Neill

20 n is an odd number.

p is a prime number.

In each part write down possible values of n and p so that

20 (a) $n + p$ is a square number.

[1 mark]

N17
N19
A6

$n =$ _____ $p =$ _____

Video created by W Neill

20 n is an odd number.

p is a prime number.

In each part write down possible values of n and p so that

20 (a) $n + p$ is a square number. Squares = 1 4 9 16 25 36 **[1 mark]**

N17
N19
A6

Odd = 1 3 5 7 9 11 13 15

prime = 2, 3, 5, 7, 11, 13

$n =$ 1 $p =$ 3 ✓

n is an odd number.

p is a prime number.

In each part write down possible values of n and p so that

20 (b) np is a square number.

[1 mark]

N19

A6

$n =$ _____ $p =$ _____

Video created by W Neill

n is an odd number.

p is a prime number.

In each part write down possible values of n and p so that

X

20 (b) np is a square number. ... Squares = 1 4 9 16 25 36 **[1 mark]**

N19
A6

Odd = 1 3 5 7 9 11 13 15

prime = 2, 3, 5, 7, 11, 13

$n =$ 3 $p =$ 3

Video created by W Neill

2 Which of these numbers is **half** of a square number?

Circle your answer.

N19

[1 mark]

1 2 3 4

Video created by W Neill

2 Which of these numbers is **half** of a square number?

Circle your answer.

N19

[1 mark]

1 2 3 4

$4 \div 2 = 2$

$1 \times 1 = 1$

$2 \times 2 = 4$

$3 \times 3 = 9$

→ Square numbers

Video created by W Neill

1 Circle the cube number.

N19

[1 mark]

100 1000 10 000 100 000

Video created by W Neill

1 Circle the cube number.

N19 **[1 mark]**

100 1000 10 000 100 000

10^3 or $10 \times 10 \times 10$

Video created by W Neill

23 Show that 268 can be written as the sum of a power of 3 and a square number.

[2 marks]

N18
N19

Answer _____

Video created by W Neill

23 Show that 268 can be written as the sum of a power of 3 and a square number.

[2 marks]

N18
N19

Power of 3

$3^1 = 3$

$3^2 = 9$

$3^3 = 27$

$3^4 = 81$

$3^5 = 243$ +

Square

$1 \times 1 = 1$

$2 \times 2 = 4$

9

16

25

36

$= 268$

$243 + 25 = 268$ ✓ ✓

$3^5 + 5^2$

Answer $3^5 + 5^2$ ✓

Video created by W Neill

20 Work out $\sqrt{121} - (13 - 5 \times 2)^2$

[3 marks]

N19
N29

Answer _____

Video created by W Neill

20 Work out $\sqrt{121} - (13 - 5 \times 2)^2$

[3 marks]

N19
N29

$\sqrt{121} = 11$

$11 - (3)^2$

$11 - 9$

$13 - 5 \times 2$

$13 - 10$

$= 3$

Answer 2

Video created by W Neill

3 What is 625 as a power of 5 ?

Circle your answer.

N18 **[1 mark]**

5^3 5^4 5^5 5^{125}

Video created by W Neill

3 What is 625 as a power of 5 ?

Circle your answer.

N18 **[1 mark]**

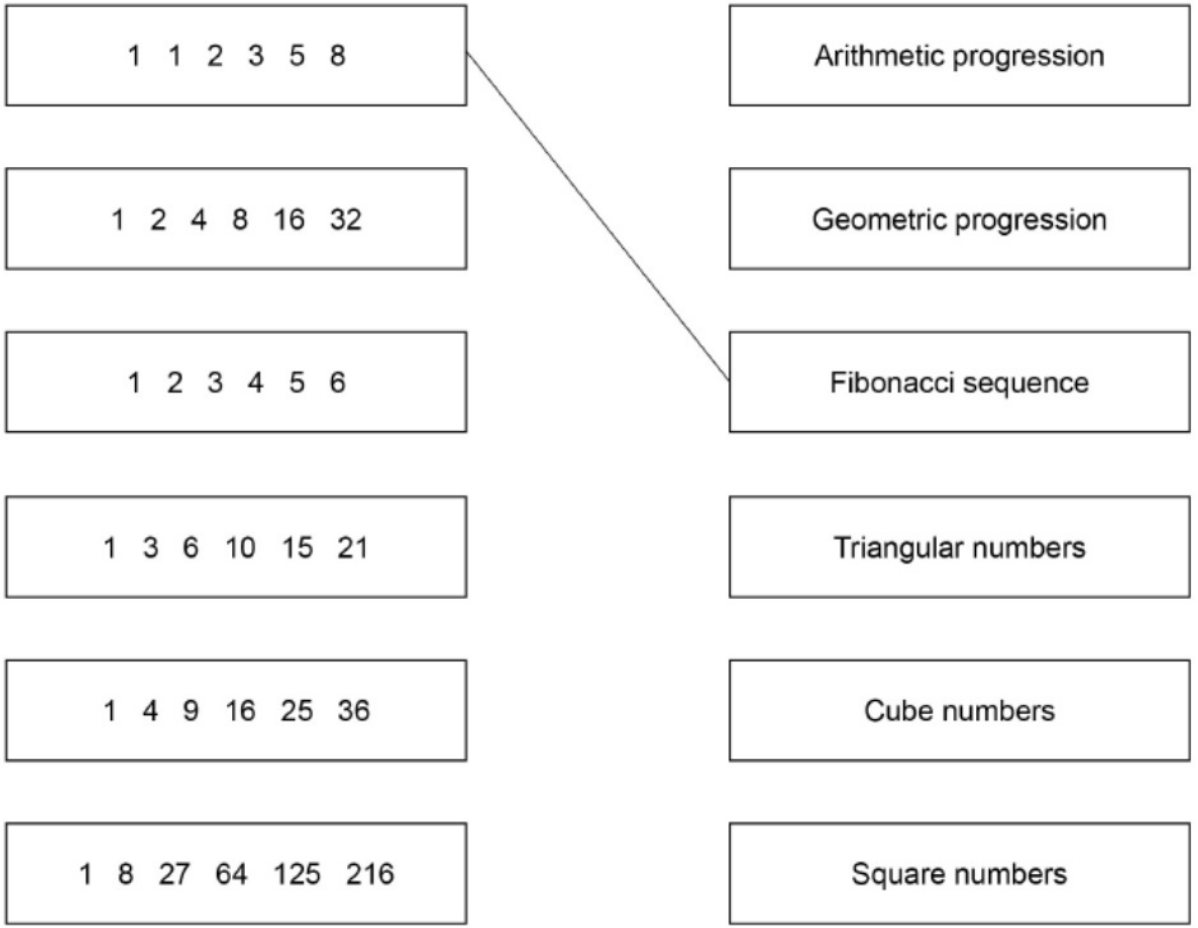
5^3 5^4 5^5 5^{125}

Video created by W Neill

23 Match each sequence to its description.

One has been done for you. **[4 marks]**

A20
N19



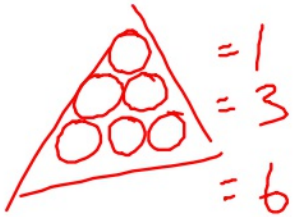
Video created by W Neill

Match each sequence to its description.

One has been done for you.

[4 marks]

A20
N19



1 1 2 3 5 8	Arithmetic progression
1 2 4 8 16 32	Geometric progression
1 2 3 4 5 6	Fibonacci sequence
1 3 6 10 15 21	Triangular numbers
1 4 9 16 25 36	Cube numbers
1 8 27 64 125 216	Square numbers

Video created by W Neill

29 $\sqrt{6^2 + 8^2} = \sqrt[3]{125a^3}$

Work out the value of a.

[4 marks]

N19
A12
A13

Answer _____

Video created by W Neill

29 $\sqrt{6^2 + 8^2} = \sqrt[3]{125a^3}$

Work out the value of a.

[4 marks]

N19
A12
A13

$\sqrt{6^2+8^2}$

$\sqrt{36+64}$

$\sqrt{100}$

$= 10$

$10 = \sqrt[3]{125a^3}$

$10^3 = 125a^3$

$1000 = 125a^3$

$\frac{1000}{125} = a^3$

$8 = a^3$

$\sqrt[3]{8} = a$

$2 = a$ $\quad a = 2$ ✓

Answer _____

Video created by W Neill

11 Circle the cube number.

N19 **[1 mark]**

9 10 000 333 729

Video created by W Neill

11 Circle the cube number.

N19

[1 mark]

9 10 000 333 729

2^3 8

Video created by W Neill

2 Which of these values of n makes 2.7×10^{n} a cube number?

Circle your answer.

[1 mark]

0 1 2 3

Video created by W Neill

2 Which of these values of n makes 2.7×10^{n} a cube number?

N47
N19

Circle your answer.

[1 mark]

0 1 2 3

$2.7 \times 10^{1} = 2.7 \times 10$

$= 27$

$3 \times 3 \times 3 = 27$

Video created by W Neill

12 $\left(ar^{b}\right)^{4} = 16r^{20}$ where a and b are positive integers.

N18

Work out a and b

[2 marks]

$a =$ _____ $b =$ _____

Video created by W Neill

12 $(ar^b)^4 = 16r^{20}$ where a and b are positive integers.

N18

Work out a and b

$b+b+b+b = 20$

$b = 5$

[2 marks]

$ar^b \times ar^b \times ar^b \times ar^b = 16r^{20}$

$a \times a \times a \times a = 16$

$\sqrt[4]{16} = 2$

$2 \times 2 \times 2 \times 2 = 16$

$a =$ 2 $b =$ 5

Video created by W Neill

1 Work out $\sqrt{2^6 + 6^2}$

Circle your answer.

N18
N19

[1 mark]

10 14 50 100

Video created by W Neill

1 Work out $\sqrt{2^6 + 6^2}$

N18
N19

Circle your answer.

[1 mark]

10 14 50 100

$2 \times 2 \times 2 \times 2 \times 2 \times 2 = 64$

$6 \times 6 = 36$

$64 + 36 = 100$

$\sqrt{100} = 10$

Video created by W Neill

6 Show that 268 can be written as the sum of a power of 3 and a square number.

[2 marks]

N18
N19

Answer _____

Video created by W Neill

6 Show that 268 can be written as the sum of a power of 3 and a square number.

[2 marks]

N18
N19

Power of 3

$3^1 = 3$

$3^2 = 9$

$3^3 = 27$

$3^4 = 81$

$3^5 = 243$ +

Square

$1 \times 1 = 1$

$2 \times 2 = 4$

9

16

25

36

$= 268$

$243 + 25 = 268$

$3^5 + 5^2$

Answer $3^5 + 5^2$ ✓

21 N is a number.

As a product of prime factors in index form $N = 2 \times 3^4 \times y^3$

N18

N21 Work out $3N^2$ as a product of prime factors in index form.

Give your answer in terms of y.

[3 marks]

Answer _____

21 N is a number.

As a product of prime factors in index form $N = 2 \times 3^4 \times y^3$

N18

N21 Work out $3N^2$ as a product of prime factors in index form.

Give your answer in terms of y.

[3 marks]

$N^2 = (2^1 \times 3^4 \times y^3) \times (2^1 \times 3^4 \times y^3)$

$N^2 = 2^2 \times 3^8 \times y^6$

$3N^2 = 2^2 \times 3^8 \times y^6 \times 3$

$= 2^2 \times 3^9 \times y^6$ ✓

Answer

Video created by W Neill

1 Work out $\sqrt[3]{64 \times 1000}$

Circle your answer.

N19 **[1 mark]**

40 80 400 4000

Video created by W Neill

1 Work out $\sqrt[3]{64 \times 1000}$

Circle your answer.

N19 **[1 mark]**

40 80 400 4000

$\sqrt[3]{64} = 4$

$\sqrt[3]{1000} = 10$

$4 \times 10 = 40$

Video created by W Neill

18 The solution of $3^x = 300$ lies between two consecutive integers.

N18 Work out the two integers.

[1 mark]

Answer _____ and _____

Video created by W Neill

18 The solution of $3^x = 300$ lies between two consecutive integers.

N18 Work out the two integers.

[1 mark]

$3^4 = 81$

$3^5 = 243$

$3^6 = 729$

Answer 5 and 6

Video created by W Neill

1 Simplify $\left(5^4\right)^2$

N18 Circle your answer.

[1 mark]

5^6 5^8 25^6 25^8

Video created by W Neill

1 Simplify $\left(5^4\right)^2$

N18 Circle your answer.

[1 mark]

5^6 5^8 25^6 25^8

$4 \times 2 = 8$