

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]**

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

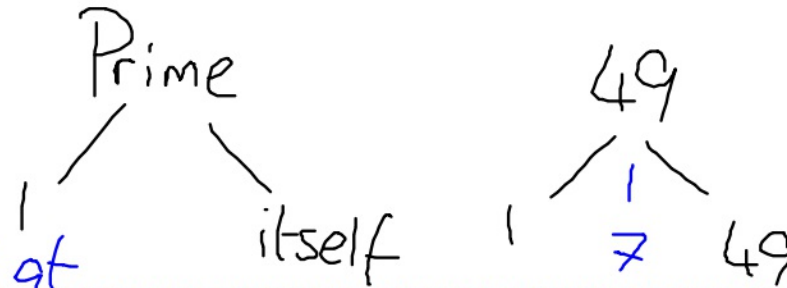
24
|
12

↗

(a) 3 and 4 [1]

(b) The integer S is a square number.

Explain why S cannot be a prime number.



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

11×11

(a)(i) 121 [1]

(ii) $\sqrt{400}$

$_ \times _ = 400$
20 20

(ii) 20 ✓ or -20 [1]

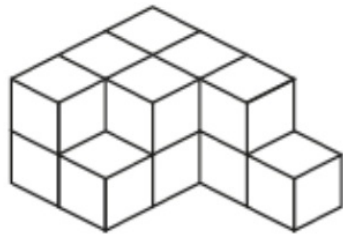
(b) Simplify.

$m^2 \times m^6$

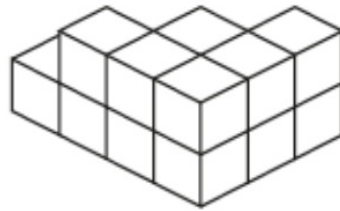
(b) m^8 [1]

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

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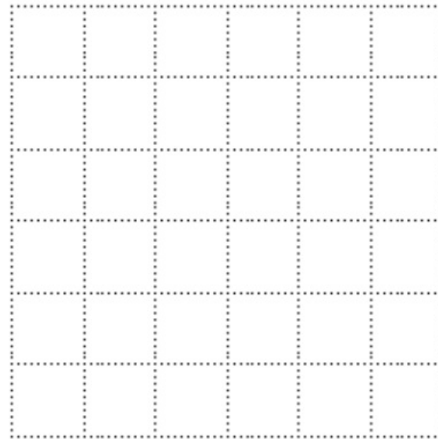
Front view



Rear view

Not to scale

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



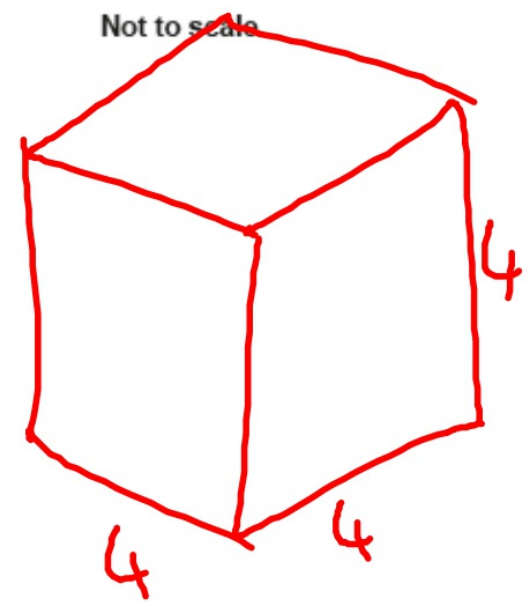
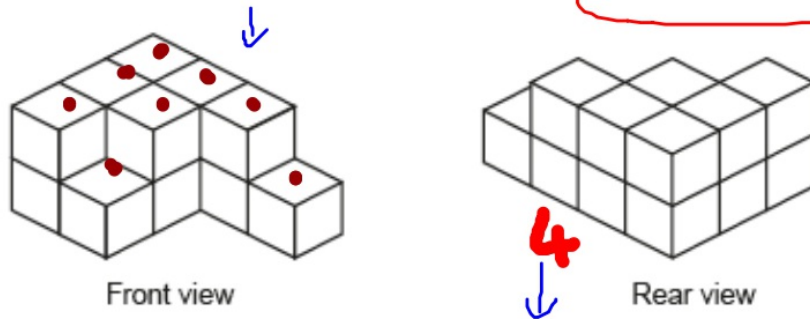
[2]

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

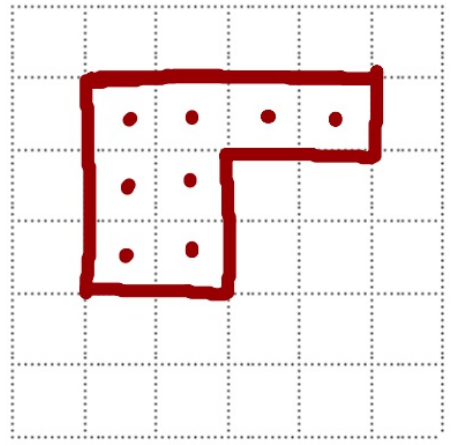
(b) [2]

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

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



$4 \times 4 \times 4$
 [2] $= 64 \text{ cm}^3$

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

$64 - 14$

50

(b) [2]

3 Here is a list of numbers.

Video created by W Neill

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]

3 Here is a list of numbers.

Video created by W Neill

11 ✓ 3 9 9 x 9 3 7
27 81 21 41 42 23 3 13 39 45
x x x ✓ x ✓ x x

From this list, write down

(a) the even number,

(a) 42 [1]

(b) the square number,

3 x 3 = 9

(b) 81 [1]

(c) all the prime numbers.

(c) 11, 23 and 41 [2]

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8 (a) Evaluate.

(i) $\sqrt{121}$

(a)(i) [1]

(ii) 4^{-2}

(ii) [1]

(b) Work out.

$(9 - 3 \times 2)^2$

(b) [2]

(c) Fill in the power.

$5^{\boxed{}} = 125$

[1]

8 (a) Evaluate.

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(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 ✓ $(9 - 3 \times 2)^2$

D ✓
M ✓
A
S

$(9 - 6)^2$
 3^2

(b) 9 [2]

(c) Fill in the power.

$5^{\boxed{3}} = 125$

$5 \times 5 \times 5 = 125$ [1]

3 (a) Find the value of y .

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

(a) $y = \dots\dots\dots$ [1]

(b) Find the values of z .

$$z^2 = 196$$

(b) $z = \dots\dots\dots$ or $z = \dots\dots\dots$ [2]

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) $y = \underline{7}$ [1]

(b) Find the values of z .

$$z^2 = 196$$

$$z = \sqrt{196}$$

$$14 \times 14 = 196$$

$$-14 \times -14 = 196$$

(b) $z = \underline{14}$ or $z = \underline{-14}$ [2]

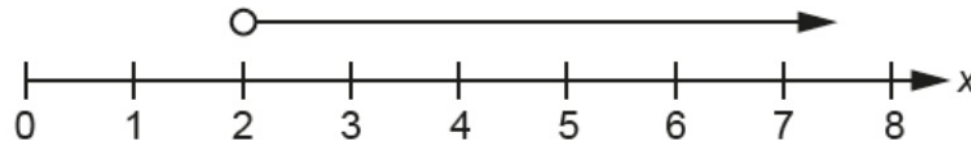
4 (a) Use one of these symbols $<$, $>$ or $=$ to make each statement true.

(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]

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

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

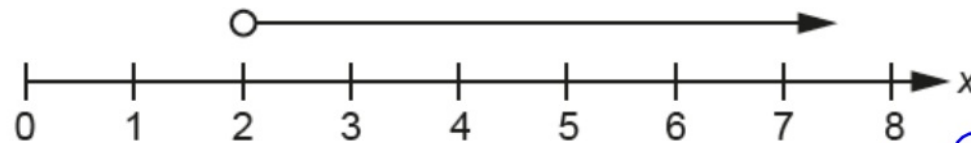
(ii) 0.66 $<$ $\frac{2}{3}$ [1]

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

(iii) 6 $<$ 2^3 [1]

$\rightarrow 8$

(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]

(b) Evaluate.

(i) 2^5

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

(b)(i) 32 [1]

(ii) $\sqrt{400}$

$$\underline{20} \times \underline{20} = \underline{400}$$

(ii) 20 [1]

or -20

$$-20 \times -20 = +400$$

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]

4 (a) Fill in each missing number.

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

(ii) $\sqrt{\dots\dots\dots} = 16$ [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) $\dots\dots\dots$ cm [1]

4 (a) Fill in each missing number.

(i) $24 - \dots - 12 \dots = 36$ [1]
 $24 + 12 = 36$

(ii) $\sqrt{\dots 256 \dots} = 16$ [1]

$$\sqrt{?} = 16 \dots 16^2$$

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

Write down the shortest possible length of the line.

10.4 $\xrightarrow{\text{longest}}$ 10.45
 $\xrightarrow{\text{smallest}}$ 10.35



(b) $\dots 10.35 \dots$ 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.

$$4^3 = 4 \times 4 \dots\dots\dots$$

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

so $4^3 = \dots\dots\dots$ [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

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

1.02×10^3

9.83×10^{-2}

3×10^2

81

1020

0.0983

300

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

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]

1 Here is a list of numbers.

2 8 5 12 6

(a) From this list, write down

(i) the odd number,

(a)(i) 5 [1]

N19 (ii) the cube number.

$$1 \times 1 \times 1 = 1$$

$$2 \times 2 \times 2 = 8$$

$$3 \times 3 \times 3 = 27$$

(ii) 8 [1]

3 (a) Work out.

118 (i) 10^3

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

129

(a)(i) [2]

(ii) [2]

3 (a) Work out.

N18 (i) 10^3

$$10 \times 10 \times 10 =$$

(a)(i) 1000 [2]

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

N29

$$9(8 - 6)$$

$$9(2)$$

mult

(ii) 18 [2]

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]

2 (a) Write down.

(i) 3091 rounded to the nearest hundred

N25

$$\begin{array}{c} \downarrow \\ 3091 \\ \uparrow \end{array}$$

(a)(i)

3100

[1]

(ii) 3% as a decimal

N46

(ii)

0.03

[1]

(iii) the cube root of 27

N19

$$\begin{array}{c} \sqrt[3]{27} \\ \underline{3} \times \underline{3} \times \underline{3} = 27 \end{array}$$

(iii)

3

[1]

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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

$$(a^3)^2 \dots \text{mult indices} \quad a^6$$

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

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

N18

N54H

(b) [3]

(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]

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

N19

$$3 \times 3 \times 3 = 27$$

(a) [1]

3

(b) Work out 7^2 .

N19

$$7 \times 7$$

(b) [2]

49

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

N54

(c) [1]

$\frac{1}{6}$

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?

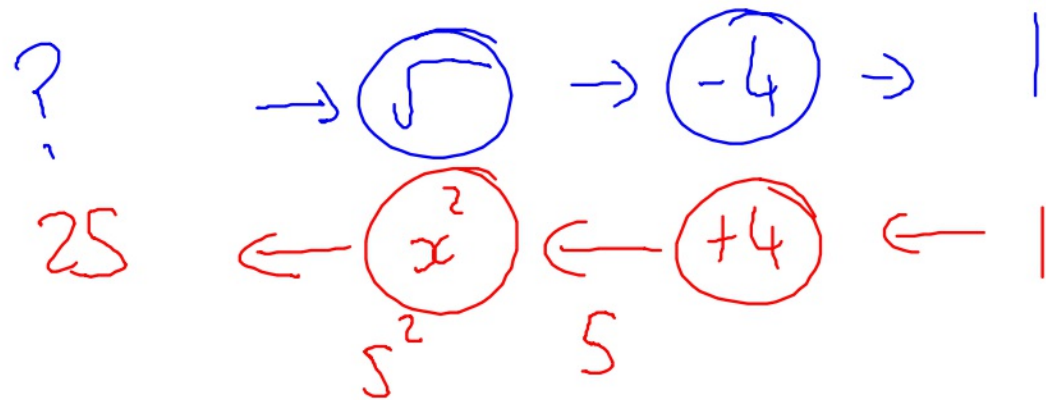
..... [2]

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]

13 (a) Work out 2^4 .

N18

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

(a) 16 [2]

(b) Find the value of n .

N18

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

$$100 = 4 \times \boxed{25}$$

$$5^2 = 25$$

$$5^2 = 25$$

(b) $n =$ 2 [2]

4 (a) Factorise.

A33 $x^2 - 43^2$

(a) [1]

(b) Calculate.

$$57^2 - 43^2$$

(b) [2]

4 (a) Factorise.

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A33

$$x^2 - 43^2$$

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

(a) [1]

(b) Calculate.

$$57^2 - 43^2 \checkmark$$

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

$$(100)(14)$$

$$1400$$

57	43
<u>x 57</u>	<u>x 43</u> ✓
399	129
2850	1720
<u>3249</u>	<u>1849</u>

$$\begin{array}{r} 3249 \\ 1849 \\ \hline 1400 \end{array}$$

(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)

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)

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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)

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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.

7²

49

(1)

(Total for Question 6 is 3 marks)

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1 Work out the value of 2^4

.....

(Total for Question 1 is 1 mark)

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1 Work out the value of 2^4

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

16

(Total for Question 1 is 1 mark)

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.

8 Here is a list of numbers.

21 22 23 24 25 26 27 28 29
 3×7 \times \circ \times \times \times \times \times \circ

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

$$3 \times 3 = 9 \checkmark$$

$$5 \times 5 = 25$$

$$\begin{array}{r} 25 \\ \hline \end{array} \quad (1)$$

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

$$\begin{array}{r} 24 \\ \hline \end{array} \quad (1)$$

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

$15 \times$
1 3 5 15

1 \nearrow 3 \searrow 7

23 and 29 \checkmark

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

(a) Find the value of x .

$$x = \frac{\dots\dots\dots}{(1)}$$

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

(b) Find the value of y .

$$y = \frac{\dots\dots\dots}{(1)}$$

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

(a) Find the value of x .

$$3 + 6 = 9$$

$$x = \frac{6}{(1)}$$

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

(b) Find the value of y .

$$2 \times \square = 10$$

$$y = \frac{5}{(1)}$$

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)

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~~

$$2 \text{ and } 7 = 9 \checkmark$$

$$3 \text{ and } 13 = 16 \checkmark$$

$$5 \text{ and } 11 = 16 \checkmark$$

$$2 \text{ and } 23 = 25 \checkmark$$

..... ,

(Total for Question 9 is 2 marks)

3 Work out the value of 3^5

243

.....
(Total for Question 3 is 1 mark)

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)

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)

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

N29 $15 + 7$

$$\begin{array}{r} 22 \\ \hline \end{array} \quad (1)$$

(b) Work out 2^3

N19 $2 \times 2 \times 2$

$$\begin{array}{r} 8 \\ \hline \end{array} \quad (1)$$

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

N29

$$7 \times (2 + 3) = 35 \quad \checkmark$$

$$7 \times 5 = 35$$

(1)

(Total for Question 5 is 3 marks)

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

N18

.....
(Total for Question 20 is 2 marks)

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

N18

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

$$7 + -2$$

$$7 - 2 = 5$$

$$\frac{3^5}{3^3} \dots \text{subtract indices}$$
$$5 - 3 = 2$$
$$3^2 = 9$$

(Total for Question is 2 marks)

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

N19

.....

(Total for Question 2 is 1 mark)

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

N19

9

(Total for Question 2 is 1 mark)

$$\begin{array}{l} 1^2 = 1 \times 1 = 1 \\ 2^2 = 2 \times 2 = 4 \\ 3^2 = 3 \times 3 = 9 \end{array}$$

4 Work out the cube root of 64

N19

.....
(Total for Question 4 is 1 mark)

4 Work out the cube root of 64

N19

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

4

(Total for Question 4 is 1 mark)

3 Find $\sqrt{1.44}$

N19

.....
(Total for Question 3 is 1 mark)

3 Find $\sqrt{1.44}$

N19

$$\frac{6}{5} \text{ or } 1.2$$

(Total for Question 3 is 1 mark)

AQA

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	
Prime numbers	2				
	3			12	
	7				

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

[1 mark]

P21

Answer _____

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
Prime numbers	+	1	4	9	16
	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

$$\frac{6}{16} = \frac{3}{8} \checkmark$$

4 Circle the value of 2^5

[1 mark]

N18

10

25

32

64

4 Circle the value of 2^5

[1 mark]

N18

10

25

32

64

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

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

[3 marks]

N19

15

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

[3 marks]

N19

$$1^3 = 1$$

$$9^3 = 729$$

$$2^3 = 8$$

$$10^3 = 1000$$

$$3^3 = 27$$

$$11^3 = >1000$$

$$4^3 = 64$$

$$5^3 = 125$$

$$6^3 = 216$$

$$7^3 = 343$$

$$8^3 = 512$$

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

$n =$ _____ $p =$ _____

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

$n =$ _____ $p =$ _____

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)
N19
A6

X
 np is a square number. ...

Squares = 1 4 9 16 25 36

[1 mark]

Odd = 1 3 5 7 9 11 13 15
prime = 2 3 5 7 11 13

$n =$ 3 $p =$ 3

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

Circle your answer.

N19

[1 mark]

1

2

3

4

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

Circle your answer.

N19

[1 mark]

1

2

3

4

$$1 \times 1 = 1$$

$$2 \times 2 = 4$$

$$3 \times 3 = 9$$

1
4
9

→ square numbers

$$4 \div 2 = 2$$

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1 Circle the cube number.

N19

[1 mark]

100

1000

10 000

100 000

1 Circle the cube number.

N19

[1 mark]

100

1000

10 000

100 000

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

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

[2 marks]

N18

N19

Answer _____

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

$$3^1 = 3$$

$$3^2 = 9$$

$$3^3 = 27$$

$$3^4 = 81$$

$$3^5 = 243 +$$

$$243 + 25 = 268$$

$$3^5 + 5^2$$

Answer

Square

$$1 \times 1 = 1$$

$$2 \times 2 = 4$$

$$3 \times 3 = 9$$

$$4 \times 4 = 16$$

$$5 \times 5 = 25$$

$$6 \times 6 = 36$$

$$= 268$$

$$3^5 + 5^2 \checkmark$$

20

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

[3 marks]

N19

N29

Answer _____

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

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3 What is 625 as a power of 5 ?

Circle your answer.

N18

[1 mark]

5^3

5^4

5^5

5^{125}

3 What is 625 as a power of 5 ?

Circle your answer.

N18

[1 mark]

5^3

5^4

5^5

5^{125}

23

Match each sequence to its description.

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A20
N19

One has been done for you.

[4 marks]

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

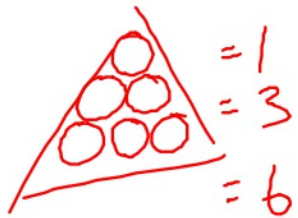
Square numbers

Match each sequence to its description.

One has been done for you.

[4 marks]

A20
N19



1 1 2 3 5 8

1 2 4 8 16 32
→ →
x2 x2

1 2 3 4 5 6

1 3 6 10 15 21

1 4 9 16 25 36

1 8 27 64 125 216

Arithmetic progression

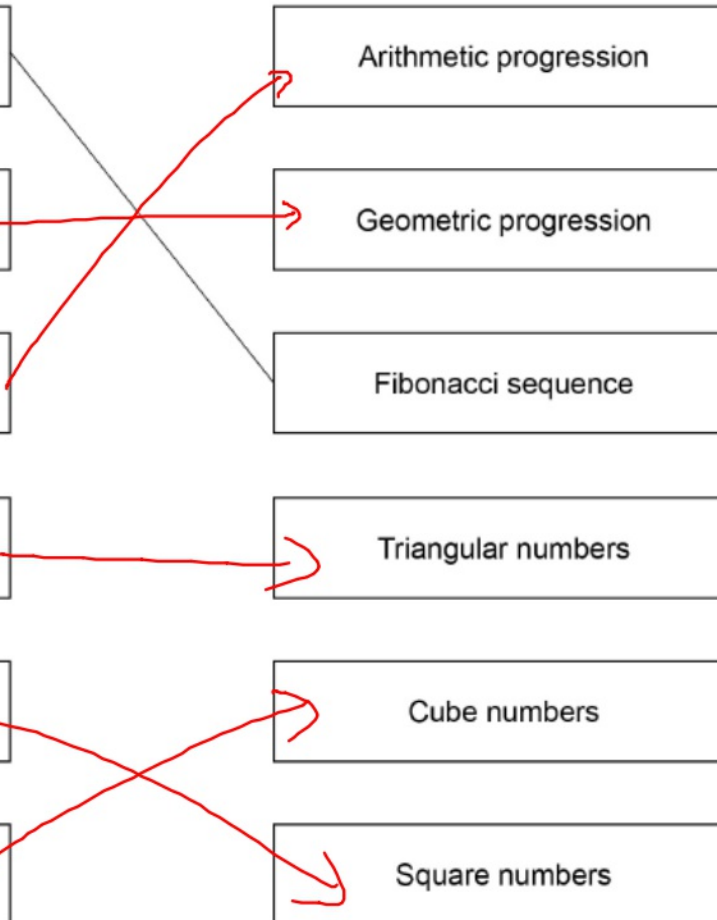
Geometric progression

Fibonacci sequence

Triangular numbers

Cube numbers

Square numbers



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

N19
A12
A13

Work out the value of a .

[4 marks]

Answer _____

29

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

N19
A12
A13

Work out the value of a .

$$\begin{aligned} &\sqrt{6^2 + 8^2} \\ &\sqrt{36 + 64} \\ &\sqrt{100} \\ &= 10 \end{aligned}$$

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

$$10^3 = 125a^3$$

$$1000 = 125a^3$$

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

$$8 = a^3$$

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

$$2 = a$$

Answer

 $a = 2 \checkmark$

[4 marks]

11 Circle the cube number.

N19

[1 mark]

9

10 000

333

729

11 Circle the cube number.

N19

[1 mark]

9

10 000

333

729

$2^3 \dots 8$

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

Circle your answer.

[1 mark]

0

1

2

3

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

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

$$3 \times 3 \times 3 = 27$$

12

N18

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

Work out a and b

[2 marks]

$a =$ _____ $b =$ _____

12

N18

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

Work out a and b

$$b+b+b+b = 20$$

$$b = 5$$

[2 marks]

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

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

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

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

$$a = \underline{2} \quad b = \underline{5}$$

1 Work out $\sqrt{2^6 + 6^2}$
Circle your answer.

N18

N19

[1 mark]

10

14

50

100

1 Work out $\sqrt{2^6 + 6^2}$
Circle your answer.

N18

N19

[1 mark]

10

14

50

100

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

$$6 \times 6 = 36$$

$$64 + 36 = 100$$

$$\sqrt{100} = 10$$

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

[2 marks]

N18

N19

Answer _____

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

$$1 \times 1 = 1$$

$$2 \times 2 = 4$$

$$3 \times 3 = 9$$

$$4 \times 4 = 16$$

$$5 \times 5 = 25$$

$$6 \times 6 = 36$$

$$243 + 25 = 268$$

$$3^5 + 5^2$$

Answer

$$3^5 + 5^2 \checkmark$$

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]

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

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

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

Answer

$$\underline{2^2 \times 3^9 \times y^6} \checkmark$$

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

Circle your answer.

N19

[1 mark]

40

80

400

4000

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

Circle your answer.

N19

[1 mark]

40

80

400

4000

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

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

$$4 \times 10 = 40$$

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

N18

Work out the two integers.

[1 mark]

Answer _____ and _____

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

1 Simplify $(5^4)^2$

N18

Circle your answer.

[1 mark]

5^6

5^8

25^6

25^8

1 Simplify $(5^4)^2$

N18

Circle your answer.

[1 mark]

5^6

5^8

25^6

25^8

$4 \times 2 = 8$