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Product Title: 11+ Mathematics: Algebra
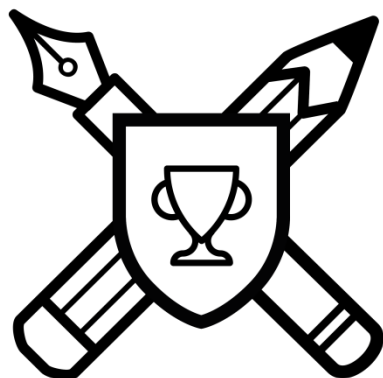
Contents:

Questions	43 pages
Answer Sheets	6 pages
Answers	2 pages

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EXAM PAPERS PLUS

11+ Mathematics

Algebra

100 Topic-Based Questions

- You will need a pencil and ruler.

- Calculators are **not** allowed.

- Use any spare space on the page for working out.

- Mark your answers on the separate answer sheet provided.

1

$2x = 16$

What is the value of x?

A   4   B   6   C   8   D   10   E   12

2

$3x - 1 = 17$

What is the value of x?

A   4   B   6   C   5.7   D   10   E   12

3

$5x + 2 = 22 + x$

What is the value of x?

A   4   B   5   C   6   D   7   E   8

4

If $10 < 2x < 14$, where x is an integer, what is the value of x?

A   4   B   2   C   8   D   5   E   6

---

5 $A = 4, B = 5, C = 8.$

What is the value of $A \times C + B$?

A   42   B   21   C   35   D   37   E   32

---

6 **Simplify $4p + 2p + p + 3$**

A $7p + 3$

B $6p + 2$

C $8p + 4$

D $7p + 2$

E $6p + 4$

---

7 **Simplify $3f + 2g + f - g$**

A $4f + 3g$

B $5f + 2g$

C $4f + g$

D $5f + 3g$

E $4f + 2g$

---

8   **Simplify** $3(h + 2) - 2(h + 1)$

    A $h + 8$

    B $h + 4$

    C h

    D $h + 1$

    E $5h + 2$

A formula for parking is $P = 2 + 0.5n$, where P is the price in pounds (£) to park and n is the number of hours for which the car is parked.

This formula is used for questions 9 and 10.

9   **What is the price for a car to park for 4 hours?**

    A   £6   **B**   £4   **C**   £8   **D**   £5.50   **E**   £7

---

10   The charge for a car to park is £7.00.

    For how long did the car park?

    A   6 hours

    B   7 hours

    C   8 hours

    D   9 hours

    E   10 hours

---

11   Harry has n marbles.
Harry gives half of his marbles to a friend and then loses 4 of his remaining marbles in the garden.

Which equation shows how many marbles Harry has left?

A $n \div 2 - 4$

B $n \div (2 - 4)$

C $(n - 4) \div 2$

D $n \div 2 + 4$

E $2n \div 2 - 4$

---

12   A number, n, has 4 added.
The answer is then doubled and the result is finally squared.

Which equation shows the correct output?

A $2n^2 + 16$

B $n^2 + 4$

C $n^2 + 4^2$

D $2(n + 4)^2$

E $(2n + 8)^2$

Page 5   Please go on to the next page >>>

13 The lengths of a rectangle are x cm and $2x$ cm.
The perimeter of the rectangle is 36 cm.

What is the value of x?

A 3   **B** 6   **C** 8   **D** 9   **E** 4

---

14 The length of a square is x cm.

If the perimeter of the square is 40 cm, what is the value of x?

A 20   **B** 15   **C** 12   **D** 10   **E** 8

---

15 The length of a square is x cm.

If the area of the square 64 cm², what is the value of x?

A 32   **B** 8   **C** 2   **D** 4   **E** 16

---

16 A 2 m length of rope is divided into 3 different lengths.
The middle length is 30 cm longer than the shortest length, and
the longest length is 20 cm longer than the middle length.

If the shortest length is given the value of x cm, which of
the following lists the three lengths in terms of x?

A x, $x + 30$, $x + 50$

B x, $x + 20$, $x + 30$

C $x + 20$, $x + 30$, $x + 50$

D x, $x + 10$, $x + 20$

E x, $x + 20$, $x + 50$

---

17 $2d = 3c$ and $4c = 5e$.

Which of the following must be true?

A $4d = 9e$

B $7 = 11e$

C $8d = 15e$

D $3d = 7e$

E $2d = 5e$

Page 7   Please go on to the next page >>>

18

If $2k + 6m = 14$, which of the following is not equivalent?

A $4k + 12m = 28$

B $2k = 14 + 6m$

C $k + 3m = 7$

D $6m = 14 - 2k$

E $2k = 14 - 6m$

19

If $(x + 1)^2 = 1$, which value can x take?

A   1   B   2   C   −1   D   0   E   3

20

18 is three-quarters of my number, N.

What is the value of N?

A   24   B   12   C   15   D   30   E   15

21

5 apples and 3 bananas cost £3.10.
3 apples and 3 bananas cost £2.10.

What is the price of one banana?

A   50 p   B   25 p   C   20 p   D   35 p   E   30 p

---

22 Letters stand for different numbers in the following question. The following words have the values of their letters added together:

C + R + O + W = 23
W + O + R + D = 14
R + O + W = 13

What is the value of the word CROWD?

A 19   **B** 29   **C** 20   **D** 17   **E** 24

---

23 At a nursery group, each child is brought to the venue in a pushchair.
Some pushchairs have three wheels and others have four wheels. The four-wheeled pushchairs are more popular than the three-wheeled pushchairs but there are more than one of each variety.

If the caretaker counts 39 wheels in total, how many three-wheeled pushchairs are present?

A 2   **B** 3   **C** 4   **D** 5   **E** 6

---

24 Ben, Bill and Binh share a box of chocolates.
Binh has two more chocolates than Bill and one more chocolate than Ben.

If there are 18 chocolates in the box, how many chocolates does Bill have?

A 4   **B** 8   **C** 7   **D** 6   **E** 5

---

25 The length of the sides of the right-angled triangle are given in cm.

$x + 2$

$3x + 4$

$2x + 1$
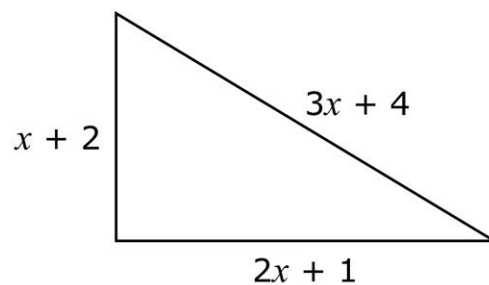
If the perimeter of the triangle is 37 cm, what is the length of the shortest side?

A 6 cm   **B** 7 cm   **C** 8 cm   **D** 9 cm   **E** 10 cm

---

26   A square and a regular pentagon are joined together and meet at two corners, as shown.
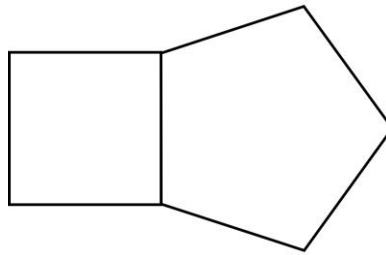
A side of the square is $2x$ cm.

If the perimeter of the shape is 42 cm, what is the value of x?

A 2   **B** 3   **C** 4   **D** 5   **E** 6

The table shows the sum of each column and row, where each different shape represents a different number.

Total:

★	✳	✳	☺	15
✚	✚	★	✳	29
★	✳	☺	✚	20
✳	☺	✳	✚	21
Total: 23	21	15	26	

The table relates to questions 27–29.

27   **What is the value of ✳ ?**

A   5   B   1   C   7   D   6   E   10

28   **What is the value of ★ ?**

A   3   B   6   C   4   D   5   E   9

29   **What is the value of** ⬚ **+** ☺ **?**

A   8   B   13   C   10   D   11   E   15

---

30   Let x and y be two positive integers (whole numbers):

$x + y = 10$ and $x - y = 4$

What is the value of the product of x and y?

A   16   B   25   C   28   D   9   E   21

---

31   There are an equal number of 10 p, 5 p and 1 p coins in a bag and no other coins.
The total value of the coins in the bag is £3.20.

How many 1 p coins are in the bag?

A   16   B   20   C   24   D   30   E   40

Page 13   Please go on to the next page >>>

32

Alice, Bella and Carl all have their birthdays on the same day.
Alice is 6 years old next year.
Bella is currently 2 years younger than Alice.
Carl will be 3 times as old as Bella next year.

How old is Carl now?

A 9   **B** 11   **C** 10   **D** 8   **E** 7

33

If A = 2x and B = 3x, what is the relationship between A and B?

A   3A = 2B

B   2A = 3B

C   A = B ÷ 2

D   Ax = Bx

E   B = A ÷ 2

34

A mobile phone contract costs £12.00 per month with 500 free texts in that month.

If more than 500 texts are sent, the price is 10 p per text for those over 500.

If more than 1000 texts are sent, the price is 20 p per text for those over 1000.

How much is the phone bill if 1020 texts are sent in one month?

A £204 **B** £52 **C** £116 **D** £66 **E** £46

35

The graph shows an equation of x plotted against y.
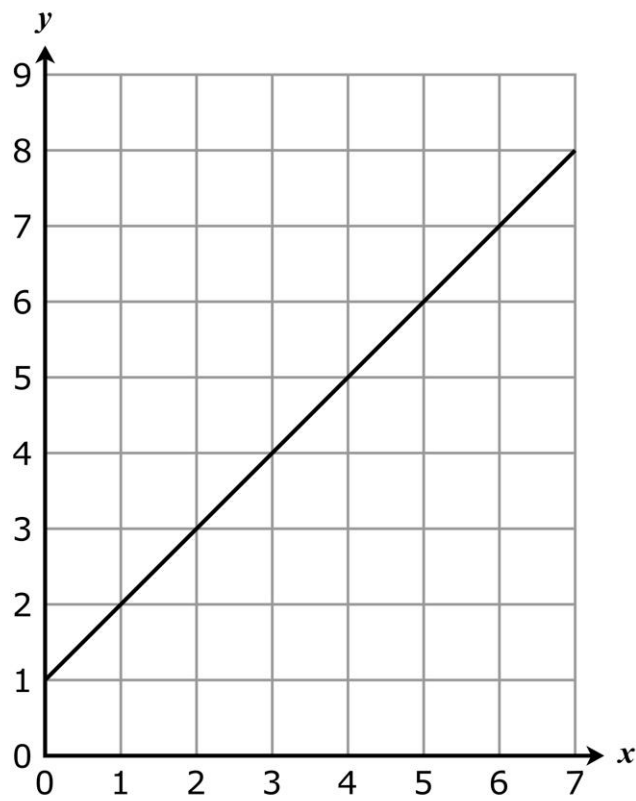
When x = 3.5, what is the value of y?

A 2.5   **B** 3   **C** 3.5   **D** 4   **E** 4.5

36

Which of the following is the equation of the graph in question 35?

A $y = x + 1$

B $y = x + 2$

C $y = x + 3$

D $y = 2x$

E $y = 2x + 0.5$

37

Fay starts with a number, N, of cards.

She puts one card to the side and then divides the cards left into two equal amounts and discards one-half.

Fay then removes two cards from the pack she is holding and divides the cards in two again, before discarding one-half.

If Fay is left with 8 cards, with how many did she start?

A 41   B 39   C 37   D 43   E 33

---

38   The volume, V, of the following cuboid is $l \times w \times h$.
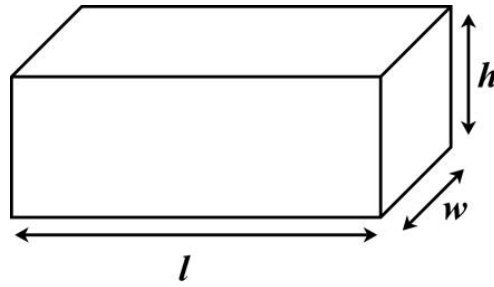
What is the height, h, of the cuboid?

A $V \div (l \times w)$

B $V \div l + w$

C $V \div w + l$

D $V \times w \times l$

E $V - w - l$

---

39   **If $2d = f + 3$, what does d equal?**

A $d = (f + 6) \div 2$

B $d = (f + 3) \div 2$

C $d = (f + 3) \div 3$

D $d = f + 3 \div 2$

E $d = 3f + 3 \div 3$

---

40 What value of x gives a solution to the equation
$3x - 1 = 2x + 1$?

A   0   B   1   C   2   D   −1   E   −2

---

41 If $3a = 12$ and $4c = 48$, what is the value of $c \div a$?

A   2   B   3   C   4   D   5   E   1

---

42 If $e + 7 = 12$ and $f - 3 = 12$, what is the value of $e \times f$?

A   10   B   15   C   25   D   50   E   75

---

43 Jim collects football stickers.
There are 120 pages in his football album and 8 spaces for stickers on each page.
Jim collects 4 football stickers each day for D number of days until the album is full.

To the nearest month, how many months does it take Jim to fill the album?

A   4   B   5   C   6   D   7   E   8

---

44 **What is the result if q is divided into $3q^2$?**
(q does not equal 0.)

A q^2 B 3   C $3q$ D 1   E q

---

45 x is an integer.
4x < 20 and 2x > 2.

What are all the possible values of x that satisfy the conditions?

A   2 and 3
B   2, 3 and 4
C   1, 2 and 3
D   2 and 4
E   3 and 4

---

46 **What is $r + r + r + 2r$ equivalent to?**

  A $4r$ **B** $4r^2$ **C** 5 **D** $5r$ **E** $3r$

---

47 **What is $w \times w \times w$ equivalent to?**

  A w^3 **B** $3w$ **C** $3w^3$ **D** $2w^2$ **E** $2w$

---

48 **If $5^x = 25$, what is the value of x?**

  A 0 **B** 1 **C** 2 **D** 3 **E** 4

---

49 **What is the value of x if $\dfrac{3+x}{2} = 8$?**

  A 16 **B** 7 **C** 11 **D** 9 **E** 13

50

If n is an odd number, what sort of number is $n + 1$?

A prime

B odd

C even

D square

E positive

51

$y = 7c + 3d$

What is the value of y if $c = 2$ and $d = 4$?

A 6   **B** 18   **C** 30   **D** 26   **E** 19

52
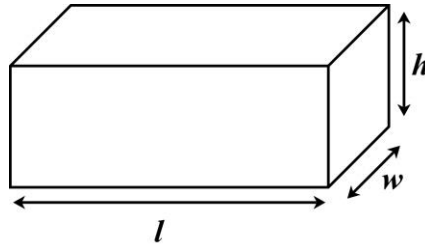
Which of the following shows the formula to work out the surface area of the cuboid?

A $2 \times (l \times w + w \times h + l \times h)$

B $2 \times (l + w + h)$

C $l \times w \times h$

D $6 \times w \times h \times l$

E $2 \times l + 2 \times w + 2 \times h$

53
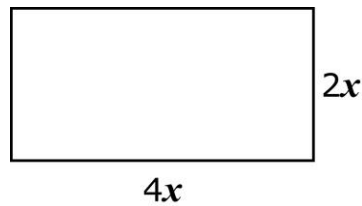
Which of the following represents the perimeter of the rectangle?

A $6x$ B $12x$ C $8x$ D $8x^2$ E $16x$

Please go on to the next page >>>

54
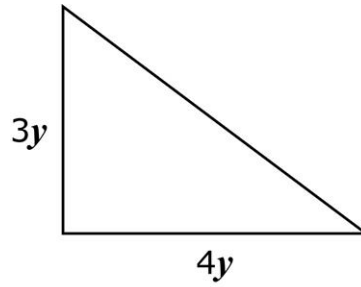
Which of the following represents the area of the triangle?

A $12y^2$ **B** $7y^2$ **C** $12y$ **D** $6y^2$ **E** 13

55

Pip will be x years old in 4 years' time.

How old is Pip now?

A $x + 4$ **B** $2x$ **C** $x - 4$ **D** $4x$ **E** 4

56

Ned is four years older than Tim.

If Ned is $p + 2$, what is Tim's age?

A $p + 6$ **B** $p + 4$ **C** $p + 2$ **D** $p - 4$ **E** $p - 2$

57

$2s = t + 5r$

What is the value of s if $t = 3$ and $r = 5$?

A 28 **B** 13 **C** 26 **D** 14 **E** 4

58

A school has x number of students in each class, y number of teachers in each class and z number of additional staff in the school.

If there are 16 classes in total, what is the total number of people in the school?

A $16(x + y) + z$

B $16(x + y + z)$

C $16x + y + z$

D $16xy + z$

E $x + y + z$

Please go on to the next page >>>

59

x is $\frac{3}{4}$ of y.

Which of the following statements is NOT correct?

A $4x = 3y$

B $8x = 6y$

C $4y = 3x$

D $9y = 12x$

E $x = 0.75y$

60

The sides of a quadrilateral are k, $2k$, $3k$ and $k \div 2$.

If the perimeter of the shape is 26 cm, what is the length of the shortest side in cm?

A 1   B 2   C 0.5   D 4   E 6

---

61 The angles of a right-angled triangle are shown.
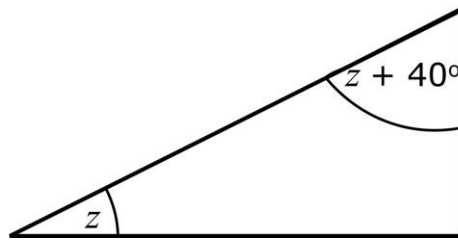
What is the value of z?

A 20°   **B** 50°   **C** 30°   **D** 40°   **E** 25°

---

62 A formula for calculating the price, in pounds (£), of renting a holiday chalet is shown below:

$120n + 10 + 3nc$

In the formula, n stands for the number of days that the chalet is booked and c stands for the number of cars to be parked at the chalet, for which there is a daily charge of £3 each per day. Linen is charged at a flat rate of £10.

If visitors with two cars stay for 10 days in the chalet, what is the price?

A £1200   **B** £1100   **C** £1270   **D** £1230   **E** £1240

63

Ayan has £10.00 with which he buys 2 drinks at a price of x pence each and 3 comics at a price of y pence each.

What is the change that Ayan receives in pounds?

A $10 - (2x + 3y) \times 100$

B $10 - 3x - 2y$

C $10 - (2x - 3y) \div 100$

D $10 - 2x \div 100 - 3y \div 100$

E $10 - 2x - 3y$

64

Dan is d years old.

His grandmother is $16 \times d$ years old and his sister is $d + 2$ years old.

If the total of their three ages is 92, how old is Dan?

A   2   B   5   C   6   D   8   E   10

65

N is a multiple of 13 between 190 and 200.
Furthermore, $N \div x = 39$.

What is the value of x?

A   78   B   13   C   5   D   39   E   4

---

66   *v* and *w* are positive integers.

If $v \div w < 1$, what must be true about $w \div v$?

A $w > v$

B $w < v$

C $w = v$

D $w \div v < 1$

E $v + w = 1$

---

67   A formula states that:
distance travelled (m) = speed (m/s) × time (s).

If a car travels 6 km in 20 minutes, what is its speed?

A   0.3 m/s   B   5 m/s   C   3 m/s   D   15 m/s   E   4 m/s

The function machine relates to questions 68–71.

$$N \longrightarrow \boxed{+\,2} \longrightarrow \boxed{\times\,3} \longrightarrow \boxed{-\,5} \longrightarrow \text{output}$$

68   **If $N = 13$, what is the output?**

 A   23   B   30   C   25   D   36   E   40

---

69   **If the output is 31, what is the value of N?**

 A   9   B   10   C   6   D   8   E   11

---

70   The first box is changed to '× 3' and the third box stays the same.

What does the second box need to be to ensure the same outputs for N?

 A   + 2   B   + 4   C   + 6   D   − 3   E   − 4

---

71   **Which value of N gives an output of 0 in the original function machine?**

A 2   **B** $-\frac{1}{3}$ **C** $\frac{2}{3}$ **D** 1   **E** 0

---

72   The sum of four consecutive even integers is 68.

What is the smallest number?

A 15   **B** 16   **C** 12   **D** 14   **E** 13

---

73   Sam has four times as much money as Dev.
Both boys are given £10 pocket money and now Sam only has twice as much money as Dev.

How much money did Dev start with?

A £5   **B** £8   **C** £4   **D** £10   **E** £6

74

A farmer has 48 m of fencing and wants to make the largest rectangular enclosure possible.

What is the largest area of enclosure the farmer can build with the fencing?

A $100\,m^2$ **B** $121\,m^2$ **C** $134\,m^2$ **D** $96\,m^2$ **E** $144\,m^2$

75

400 litres of water are in a tank.
It drains at a constant rate.
After 4 minutes of the water draining, there are 180 litres left in the tank.

How many litres drained in the first minute?

A   45 litres

B   55 litres

C   65 litres

D   35 litres

E   75 litres

---

76 Mr Bill has a handful of £5 notes and £10 notes only.
He has a total of 20 notes with a value of £140.

How many £5 notes does Mr Bill have?

A 10 **B** 14 **C** 12 **D** 8 **E** 9

---

77 If the same number, n, is added to the numerator and denominator of the fraction $\frac{2}{3}$, the resulting fraction is equivalent to 80%.

What is the value of n?

A 5 **B** 4 **C** 3 **D** 1 **E** 2

---

78 The sum of two numbers is 104 and their difference is 40.

What is the smaller number?

A 92 **B** 32 **C** 12 **D** 42 **E** 22

Page 33   Please go on to the next page >>>

79   Three consecutive odd numbers multiply together to make 315.

What is the mean of the numbers?

A 7   B 8   C 9   D 5   E 11

---

80   Marge is 13 and has two younger brothers who are 2 and 3.

In how many years will Marge's age equal the total ages of her brothers?

A 7   B 5   C 6   D 8   E 4

---

81   Finlay has four different sized cubes.
Each one is 4 cm taller than the previous one.
The height of the largest cube is the same height as the smallest and second smallest cube put together.

What is the height of the smallest cube?

A 4 cm   B 8 cm   C 6 cm   D 10 cm   E 12 cm

---

82 Which of the following numbers could replace n so that the value of $5 \times n \div 6$ lies between 14 and 15?

A 18   B 16   C 15   D 17   E 19

---

83 Let $a \sim b = a \times b - (a + b)$.

If $3 \sim 7 = 4 \sim x$, what is the value of x?

A 2   B 3   C 5   D 4   E 6

---

84 A briefcase with a bar of gold weighs 4 kg.
A handbag with the same bar of gold weighs 3 kg.
The briefcase and the handbag, with no gold, weigh 2 kg.

How much does the bar of gold weigh?

A 2 kg   B 1.5 kg   C 3 kg   D 3.5 kg   E 2.5 kg

85

$M \times M \times N \times 2 = N \times P \times Q$

The letters stand for different positive integers that are all less than 9.

What is the value of M?

A 1   **B** 2   **C** 3   **D** 4   **E** 5

86

☆ + ☆ = △ + △ + △ + ☆

A star and a triangle stand for different numbers.

If a star is equal to 18, what is the value of a triangle?

A 6   **B** 10   **C** 4   **D** 9   **E** 8

87

F, G and H stand for three positive integers.
$F + G = 80$, $G + H = 100$ and $F + H = 60$.

What is the value of $F + G + H$?

A 240   **B** 100   **C** 160   **D** 120   **E** 140

Ken makes a pattern of shapes with circles:

Shape 1	Shape 2	Shape 3	Shape 4
5 circles	9 circles	13 circles	17 circles
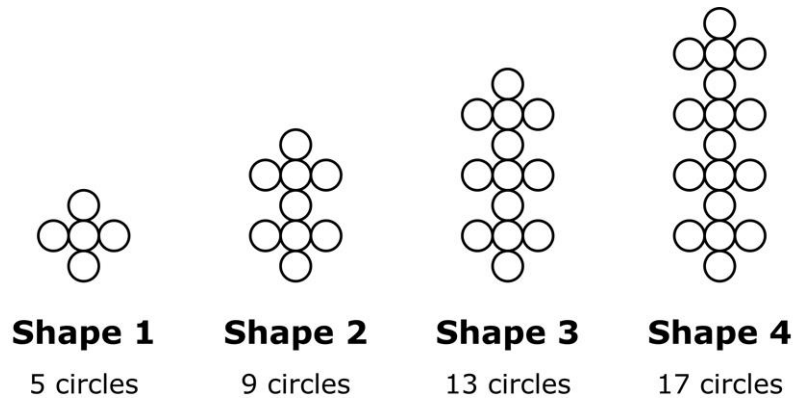
The pattern of shapes relates to questions 88–90.

88   **Which of the following is the formula to determine the number of circles in each shape number, n?**

A $3n + 2$

B $2n + 5$

C $4n + 1$

D $n + 4$

E $5n$

89   **How many circles are in the 20th shape?**

A   73   B   81   C   87   D   91   E   59

90   **In which shape are there 129 circles?**

   A 18   **B** 24   **C** 40   **D** 28   **E** 32

---

91   **Which of the following shows $3(x - 2)$ expanded correctly?**

   A $3x - 6$
   B $3x - 2$
   C $3x + 2$
   D $3x + 6$
   E $x - 2$

---

92   The lines $x = 2$ and $y = 3$ have been drawn on the graph.
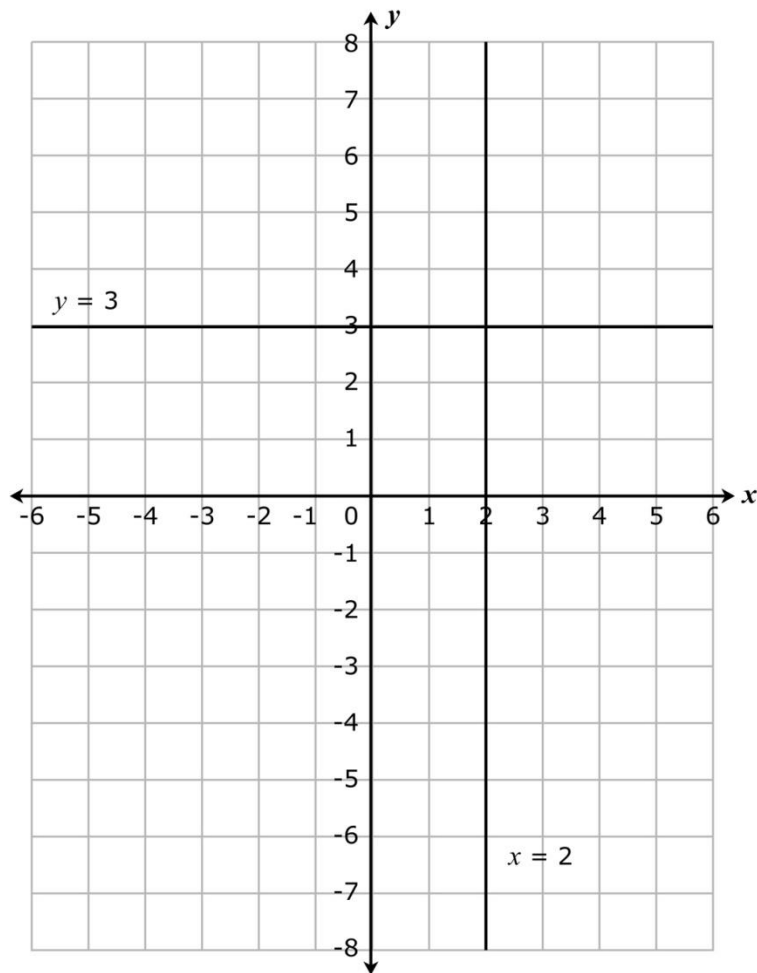
Which of the points below would be found in the region satisfying all of the following conditions:

$x > -3$, $x < 2$, $y > 0$ and $y < 3$?

A   (0, 0)

B   (1, 2)

C   (−3, 2)

D   (0, 3)

E   (10, 10)

93 This regular hexagon has a height of $4h$ cm and its perimeter is 12 cm.
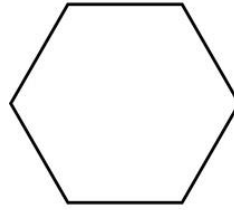
What is the area of the hexagon?

A $4h$ cm²

B $8h$ cm²

C $12h$ cm²

D $24h$ cm²

E $16h$ cm²

---

94 The letters in the following sum stand for different digits:

$$
\begin{array}{r}
N \ J \ N \\
+ \ J \ N \ J \\
\hline
F \ L \ L \ F
\end{array}
$$

If $7 > N > J$, what is the value of $N - J$?

A 2   B 0   C 1   D 3   E 4

95

If $x \div 2 + 1 = 21$, what is the value of x?

A 18   **B** 16   **C** 30   **D** 20   **E** 40

96

The lengths of the rectangle and square are given.

Not to scale.
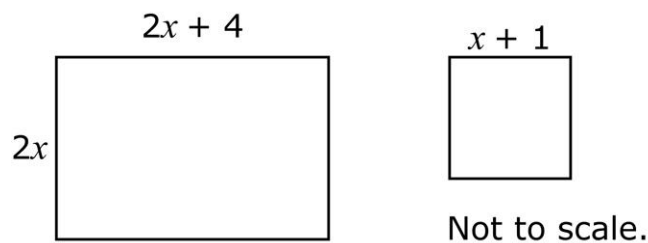
What is the ratio of the perimeter of the square to the perimeter of the rectangle in its lowest form?

A 1:2   **B** 1:3   **C** 1:4   **D** 2:1   **E** 2:3

97

If $5r + 3 = 2r - 6$, what is the value of r?

A 3   **B** −3   **C** −6   **D** −1   **E** 2

---

98 The shape is made from a square and an isosceles triangle.
The width of the shape is $5s$ cm and the height is $7s$ cm.

$7s$

Not to scale.

$5s$
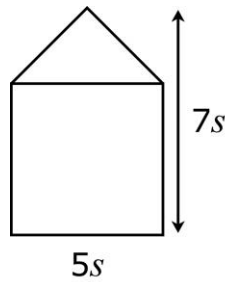
If the area of the shape is 3000 cm², what is the value of s?

A 100   **B** 50   **C** 20   **D** 10   **E** 4-

---

99 The price to hire a boat is £20 + £10 per hour + £5 per person for life jackets.

If a family of four hires a boat for 3 hours, what is the price?

A £55   **B** £65   **C** £60   **D** £50   **E** £70

---

100 **Given that x is a positive integer, which one of the following statements is true?**

    A $2x$ can be an odd number.

    B x^2 is always even.

    C $x^3 - 1$ is always odd.

    D $2x + 1$ is always odd.

    E $x - (x + x) > 0$
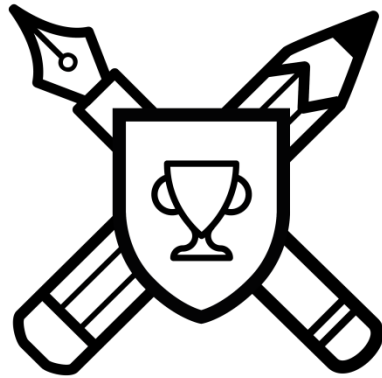
11+ Mathematics

Algebra

Answer Sheets

Answer Sheets

Please mark boxes with a thin horizontal line like this ▭.

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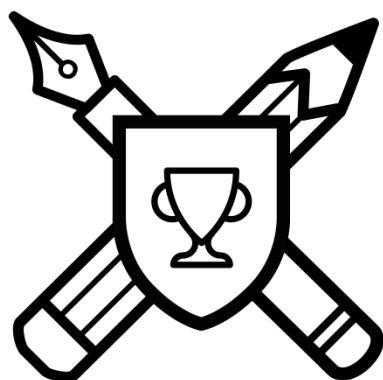
11+ Mathematics

Algebra

Answers

1.	C	**40.**	C	**79.**	A
2.	B	**41.**	B	**80.**	D
3.	B	**42.**	E	**81.**	B
4.	E	**43.**	E	**82.**	D
5.	D	**44.**	C	**83.**	C
6.	A	**45.**	B	**84.**	E
7.	C	**46.**	D	**85.**	B
8.	B	**47.**	A	**86.**	A
9.	B	**48.**	C	**87.**	D
10.	E	**49.**	E	**88.**	C
11.	A	**50.**	C	**89.**	B
12.	E	**51.**	D	**90.**	E
13.	B	**52.**	A	**91.**	A
14.	D	**53.**	B	**92.**	B
15.	B	**54.**	D	**93.**	C
16.	A	**55.**	C	**94.**	C
17.	C	**56.**	E	**95.**	E
18.	B	**57.**	D	**96.**	A
19.	D	**58.**	A	**97.**	B
20.	A	**59.**	C	**98.**	D
21.	C	**60.**	B	**99.**	E
22.	E	**61.**	E	**100.**	D
23.	D	**62.**	C		
24.	E	**63.**	D		
25.	B	**64.**	B		
26.	B	**65.**	C		
27.	A	**66.**	A		
28.	C	**67.**	B		
29.	D	**68.**	E		
30.	E	**69.**	B		
31.	B	**70.**	C		
32.	B	**71.**	B		
33.	A	**72.**	D		
34.	D	**73.**	A		
35.	E	**74.**	E		
36.	A	**75.**	B		
37.	C	**76.**	C		
38.	A	**77.**	E		
39.	B	**78.**	B		