



Answers

Non-Calculator

KS4

Mastery:
Foundation
Booklet

1



Non-Calculator

KS4 Mastery: Foundation

Booklet 1 **Answers**

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18. A bag contains 5 red counters, 3 green counters and 2 blue counters. A counter is chosen at random. What is the probability of choosing a yellow counter?

0

19. A school must provide teachers to pupils in the ratio 3:20 for a school trip. If 41 students attend, how many teachers must go on the trip?

$$41 \div 20 = 2 \text{ r } 1$$

$$2 \times 3 = 6$$

$$6 + 1 = 7$$

7 teachers must go on the trip.

20. x and y are integers.

$$x < -4$$

$$y > -10$$

Work out the largest negative value of $x - y$.

$$-5 - (-4) = -1$$

Week 7

13. Solve $4x - 3 = x + 2$

Give your answer as a fraction.

$$3x - 3 = 2$$

$$3x = 5$$

$$x = \frac{5}{3}$$

14. Find the range of the following set of numbers:

-4, -10, -3, -8, -7

$$-3 - (-10) = 7$$

15. A regular polygon has an interior angle of 144° . Work out the number of sides this polygon has.

$$180 - 144 = 36^\circ$$

$$360 \div 36 = 10 \text{ sides}$$

16. Write down the value of $\sin(30^\circ)$.

$$\frac{1}{2}$$

17. 2 cups of tea and 3 slices of cake cost £3.80.

1 cup of tea and 2 slices of cake cost £2.30.

Work out the cost of 1 slice of cake and 1 cup of tea.

$$2 \text{ cups of tea and 4 slices of cake cost } £2.30 \times 2 = £4.60.$$

$$1 \text{ slice of cake costs } £4.60 - £3.80 = 80\text{p}.$$

$$1 \text{ cup of tea costs } £2.30 - (2 \times 80\text{p}) = 70\text{p}.$$

$$1 \text{ slice of cake and 1 cup of tea will cost } £1.50.$$

Question Number	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7
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Week 1

1. Work out $3 \times 2 + 4$

$$6 + 4 = 10$$

2. Simplify $7y + 8y + 2y$

$$17y$$

3. Simplify $\frac{9}{15}$

$$\frac{3}{5}$$

4. Evaluate $3x + 2y$ if $x = 4$ and $y = 1$

$$3 \times 4 + 2 \times 1 = 14$$

5. Expand and simplify $2(x + 5)$

$$2x + 10$$

6. Write 40 as a product of its prime factors.

$$2 \times 2 \times 2 \times 5 \text{ or } 2^3 \times 5$$

7. Share £20 in the ratio 1:4

$$£20 \div 5 = £4$$

$$£4:£16$$

8. Write down the gradient of the line whose equation is $3y = 5 - 15x$

$$-5$$

9. Simplify $2xy^2 \times 3x$

$$6x^2y^2$$

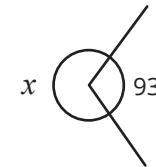
10. $y = 2x^2 - x$; what is the value of y when $x = -2$?

$$y = 2 \times (-2)^2 - (-2) = 10$$

11. Find the area of a rectangle whose width is y cm and whose height is $(y - 2)$ cm. Give your answer in expanded form.

$$y(y - 2) = (y^2 - 2y)\text{cm}^2$$

12. Find the missing angle, marked x . Give a reason for your answer.



$$360 - 93 = 267^\circ, \text{ angles around a point add to } 360^\circ.$$

Week 7

1. Work out $8 \times 5 \div 2^2$

$$8 \times 5 \div 4 = 40 \div 4 = 10$$

2. Simplify $8x \times 4x + 2 \times 5x + 3x \times 2x$

$$38x^2 + 10x$$

3. Simplify $\frac{7x}{28}$
 $\frac{x}{4}$

4. Evaluate $\frac{2x^2}{y}$ if $x = 5$ and $y = 4$

$$\frac{2 \times 5^2}{4} = \frac{50}{4} = \frac{25}{2} \text{ or } 12.5$$

5. Expand and simplify $(x + 5)(x + 1)$

$$x^2 + 6x + 5$$

6. Write 3×150 as a product of its prime factors. Give your answer in index form.

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

7. Share £4 in the ratio 2:3:5

$$£4 \div 10 = £0.40$$

$$£0.80:£1.20:£2$$

8. Write down the gradient of the line whose equation is $y = 5x + 3$

$$5$$

9. Simplify $x^4 \times x^7$

$$x^{11}$$

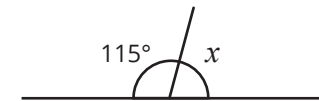
10. $y = 2x + 1$; what is the value of y when $x = 2$?

$$y = 2 \times 2 + 1 = 5$$

11. Find the area of a rectangle whose width is 8cm and whose height is 4cm.

$$8 \times 4 = 32\text{cm}^2$$

12. Find the missing angle, marked x . Give a reason for your answer.



$$x = 180 - 115 = 65^\circ, \text{ angles on a straight line add to } 180^\circ.$$

Week 1

13. Solve $3x = 21$

$x = 7$

14. Find the median of the following set of numbers:

4, 5, 7, 7, 8, 9, 10

7

15. A regular polygon has an exterior angle of 30° .
Work out the number of sides this polygon has.

$360 \div 30 = 12$ sides

16. Write down the value of $\sin(0^\circ)$.

0

17. 1 cup of tea and 3 slices of cake cost £4.50.

1 cup of tea and 1 slice of cake cost £1.90.

Work out the cost of 1 slice of cake.

2 slices of cake cost £2.60 so 1 slice costs £1.30.

18. A bag contains 5 red counters, 3 green counters and 2 blue counters. A counter is chosen at random. What is the probability of choosing a red or a green counter? Give your answer as a fraction in its simplest form.

$$\frac{8}{10} = \frac{4}{5}$$

19. A school must provide teachers to pupils in the ratio 2:5 for a school trip. If 20 students attend, how many teachers must go on the trip?

$$20 \div 5 = 4$$

$4 \times 2 = 8$ teachers.

20. x and y are integers.

$$x > 4$$

$$y < 10$$

Work out the smallest negative value of $x - y$.

$$5 - 9 = -4$$

Week 6

13. Solve $2(x + 3) = 8$

$$2x + 6 = 8$$

$$2x = 2$$

$$x = 1$$

14. Find the range of the following set of numbers:

$$-3, -1, 0, -2, 7$$

$$7 - (-3) = 10$$

15. A regular polygon has an interior angle of 135° . Work out the number of sides this polygon has.

$$180 - 135 = 45^\circ$$

$$360 \div 45 = 8 \text{ sides}$$

16. Write down the value of $\sin(180^\circ)$.

$$0$$

17. 2 cups of tea and 3 slices of cake cost £5.30.

1 cup of tea and 1 slice of cake cost £1.90.

Work out the cost of 1 cup of tea.

$$2 \text{ cups of tea and 2 slices of cake cost } £1.90 \times 2 = £3.80.$$

$$1 \text{ slice of cake costs } £5.30 - £3.80 = £1.50.$$

$$1 \text{ cup of tea costs } £1.90 - £1.50 = 40p.$$

18. A fair, six-sided dice is thrown. Write down the probability that the dice lands on a number greater than 4. Give your answer as a fraction in its simplest form.

$$\frac{2}{6} = \frac{1}{3}$$

19. A school must provide teachers to pupils in the ratio 1:7 for a school trip. If 8 teachers attend the trip, how many pupils can go?

$$8 \times 7 = 56 \text{ pupils}$$

20. x and y are integers.

$$x > 20$$

$$y \leq 40$$

Work out the largest possible value of $y - x$.

$$40 - 21 = 19$$

Week 2

1. Work out $11 - 2 \times 4$

$$11 - 8 = 3$$

2. Simplify $4a + 8a - 2a$

$$10a$$

3. Simplify $\frac{18}{27}$

$$\frac{2}{3}$$

4. Evaluate $3x + 2y$ if $x = 3$ and $y = -1$

$$3 \times 3 + 2 \times -1 = 7$$

5. Expand and simplify $3(x - 4)$

$$3x - 12$$

6. Write 120 as a product of its prime factors. Give your answer in index form.

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

7. Share £80 in the ratio 3:5

$$£80 \div 8 = £10$$

$$£30:£50$$

8. Write down the gradient of the line whose equation is $2y = 5 - 8x$

$$-4$$

9. Simplify $3x^2y \times 8xy^2$

$$24x^3y^3$$

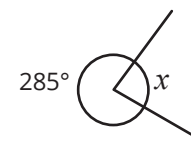
10. $y = x^2 + 3x + 1$; what is the value of y when $x = 2$?

$$y = 2^2 + 3 \times 2 + 1 = 11$$

11. Find the area of a rectangle whose width is x cm and whose height is $(x + 5)$ cm. Give your answer in expanded form.

$$x(x + 5) = (x^2 + 5x)\text{cm}^2$$

12. Find the missing angle, marked x . Give a reason for your answer.



$$360 - 285 = 75^\circ, \text{ angles around a point add to } 360^\circ.$$

Week 6

1. Work out $8 - 3 \times 2^2$

$$8 - 3 \times 4 = 8 - 12 = -4$$

2. Simplify $3 \times 2x - 4 \times x$

$$2x$$

3. Simplify $\frac{16x}{2}$

$$8x$$

4. Evaluate $\frac{y^2}{4}$ if $y = -8$

$$\frac{(-8)^2}{4} = 16$$

5. Expand and simplify $(x + 2)(x + 3)$

$$x^2 + 5x + 6$$

6. Write 2×90 as a product of its prime factors. Give your answer in index form.

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

7. Share £25 in the ratio 1:3

$$£25 \div 4 = £6.25$$

$$£6.25:£18.75$$

8. Write down the gradient of the line whose equation is $y = 4 - 3x$

$$-3$$

9. Simplify $x^8 \times x^{-3}$

$$x^5$$

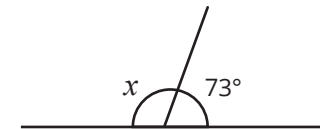
10. $y = 4x - 3$; what is the value of y when $x = -5$?

$$y = 4 \times (-5) - 3 = -23$$

11. Find the perimeter of a rectangle whose width is 8cm and whose height is 4cm.

$$2 \times (8 + 4) = 24\text{cm}$$

12. Find the missing angle, marked x . Give a reason for your answer.



$$x = 180 - 73 = 107^\circ, \text{ angles on a straight line add to } 180^\circ.$$

Week 2

13. Solve $a - 2 = 10$

$a = 12$

14. Find the median of the following set of numbers:

5, 9, 1, 2, 10, 3, 11

5

15. A regular polygon has an exterior angle of 60° . Work out the number of sides this polygon has.

$360 \div 60 = 6$ sides

16. Write down the value of $\cos(0^\circ)$.

1

17. 1 cup of tea and 3 slices of cake cost £3.80.

1 cup of tea and 1 slice of cake cost £1.60.

Work out the cost of 1 cup of tea.

2 slices of cake cost £2.20 so 1 slice costs £1.10.

1 cup of tea costs £1.60 - £1.10 = 50p

18. A bag contains 15 red counters and 20 blue counters. A counter is chosen at random. What is the probability of choosing a blue counter? Give your answer as a fraction in its simplest form.

$\frac{20}{35} = \frac{4}{7}$

19. A school must provide teachers to pupils in the ratio 2:5 for a school trip. If 8 teachers attend, how many students can go on the trip?

$8 \div 2 = 4$

$4 \times 5 = 20$ students.

20. x and y are integers.

$x > 20$

$y \leq 40$

Work out the smallest possible value of $\frac{x}{y}$.

$21 \div 40 = 0.525$

Week 5

13. Solve $\frac{x}{5} = 15$
 $x = 75$

14. Find the median of the following set of numbers:

-3, -1, 0, -2

-1.5

15. A regular polygon has an interior angle of 140° . Work out the number of sides this polygon has.

$180 - 140 = 40^\circ$

$360 \div 40 = 9$ sides

16. Write down the value of $\cos(90^\circ)$.

0

17. 1 cup of tea and 3 slices of cake cost £4.90.

1 cup of tea and 1 slice of cake cost £2.00.

Work out the cost of 2 cups of tea.

2 slices of cake cost £2.90 so 1 slice costs £1.45.

1 cup of tea costs £2.00 - £1.45 = 55p

Therefore, 2 cups of tea cost $55p \times 2 = £1.10$.

18. A fair, six-sided dice is thrown. Write down the probability that the dice does not land on a multiple of 3. Give your answer as a fraction in its simplest form.

$\frac{4}{6} = \frac{2}{3}$

19. A school must provide teachers to pupils in the ratio 1:7 for a school trip. If 35 students attend the trip, how many teachers must go?

$35 \div 7 = 5$

20. x and y are positive integers.

$x > 20$

$y \leq 40$

Work out the smallest possible value of $y + x$.

$1 + 21 = 22$

Week 3

1. Work out $7 + 2 \times 5 - 2$

$$7 + 10 - 2 = 15$$

2. Simplify $3x - x + 4x - 2x$

$$4x$$

3. Simplify $\frac{42}{56}$

$$\frac{3}{4}$$

4. Evaluate $5xy$ if $x = -2$ and $y = -1$

$$5 \times -2 \times -1 = 10$$

5. Expand and simplify $2(x - 9)$

$$2x - 18$$

6. Write 180 as a product of its prime factors. Give your answer in index form.

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

7. Share £45 in the ratio 2:7

$$£45 \div 9 = £5$$

$$£10:£35$$

8. Write down the gradient of the line whose equation is $2y = 4x + 1$

$$2$$

9. Simplify $9xy \times 5x$

$$45x^2y$$

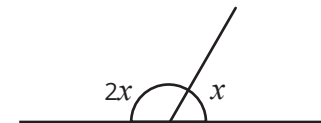
10. $y = 2x^2 + x$; what is the value of y when $x = -4$?

$$y = 2 \times (-4)^2 + (-4) = 28$$

11. Find the area of a triangle whose width is 4cm and whose perpendicular height is 15cm.

$$4 \times 15 \div 2 = 30\text{cm}^2$$

12. Find the missing angle, marked x . Give a reason for your answer.



$$3x = 180, 180 \div 3 = 60^\circ, \text{ angles on a straight line add up to } 180^\circ$$

Week 5

1. Work out $1 + (2 + 5) \times 3$

$$1 + 7 \times 3 = 1 + 21 = 22$$

2. Simplify $x^2 + 2x - 3y - x^2 - 4y - 2x$

$$-7y$$

3. Simplify $\frac{15x}{20x}$

$$\frac{3}{4}$$

4. Evaluate xy^2 if $x = -1$ and $y = -3$

$$-1 \times (-3)^2 = -9$$

5. Expand and simplify $5x(x - y)$

$$5x^2 - 5xy$$

6. Write 900 as a product of its prime factors. Give your answer in index form.

$$2^2 \times 3^2 \times 5^2 \text{ or } (2 \times 3 \times 5)^2$$

7. Share £55 in the ratio 1:3:7

$$£55 \div 11 = £5$$

$$£5:£15:£35$$

8. Write down the gradient of the line whose equation is $y = \frac{4x + 7}{2}$

$$2$$

9. Simplify $x^{-4} \times x$

$$x^{-3}$$

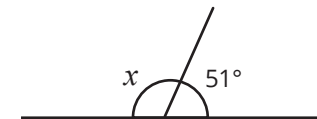
10. $y = 2x - 9$; what is the value of y when $x = -8$?

$$y = 2 \times (-8) - 9 = -25$$

11. Find the perimeter of a rectangle whose width is 3.5cm and whose height is 2cm.

$$2 \times (3.5 + 2) = 11\text{cm}$$

12. Find the missing angle, marked x . Give a reason for your answer.



$$x = 180 - 51 = 129^\circ, \text{ angles on a straight line add to } 180^\circ.$$

Week 3

13. Solve $x + 7 = 23$

$a = 16$

14. Find the median of the following set of numbers:

10, 2, -1, 7, 8, 15, 2

7

15. A regular polygon has an exterior angle of 40° . Work out the number of sides this polygon has.

$360 \div 40 = 9$ sides

16. Write down the value of $\sin(90^\circ)$.

1

17. 1 cup of tea and 4 slices of cake cost £9.00.

1 cup of tea of 1 slice of cake cost £2.70.

Work out the cost of 1 cup of tea.

3 slices of cake cost £6.30 so 1 slice costs £2.10.

1 cup of tea costs £2.70 – £2.10 = 60p

18. A bag contains 5 red counters and 3 blue counters. A counter is chosen at random. What is the probability of choosing a blue counter? Give your answer as a fraction in its simplest form.

$\frac{3}{8}$

19. A school must provide teachers to pupils in the ratio 1:7 for a school trip. If 50 students attend the trip, what is the minimum number of teachers that must go?

$50 \div 7 = 7$ remainder 1

8 teachers must go.

20. x and y are positive integers.

$x > 20$

$y \leq 40$

Work out the smallest positive value of xy .

$21 \times 1 = 21$

Week 4

13. Solve $3b + 5 = 17$

$$3b = 12$$

$$b = 4$$

14. Find the median of the following set of numbers:

4, 6, 10, 2, 13, 5

5.5

15. A regular polygon has an interior angle of 60° . Work out the number of sides this polygon has.

$$180 - 60 = 120^\circ$$

$$360 \div 120 = 3 \text{ sides}$$

16. Write down the value of $\tan(0^\circ)$.

0

17. 1 cup of tea and 3 slices of cake cost £3.80.

1 cup of tea and 1 slice of cake cost £1.60.

Work out the cost of 3 slices of cake.

2 slices of cake cost £2.20 so 1 slice costs £1.10.

3 slices of cake cost £3.30.

18. A fair, six-sided dice is thrown. Write down the probability that the dice lands on a prime number. Give your answer as a fraction in its simplest form.

$$\frac{3}{6} = \frac{1}{2}$$

19. A school must provide teachers to pupils in the ratio 1:9 for a school trip. If 54 students attend the trip, how many teachers must go?

$$54 \div 9 = 6 \text{ teachers}$$

20. x and y are integers.

$$x > 60$$

$$y > 35$$

Work out the smallest possible value of $y + x$.

$$36 + 61 = 97$$

Week 4

1. Work out 2×3^2

$$2 \times 9 = 18$$

2. Simplify $3x^2 + 2x - x^2 + 4x$

$$2x^2 + 6x$$

3. Simplify $\frac{28x}{35x}$

$$\frac{4}{5}$$

4. Evaluate $4x^2$ if $x = -2$

$$4 \times (-2)^2 = 16$$

5. Expand and simplify $3x(2x + 1)$

$$6x^2 + 3x$$

6. Write 175 as a product of its prime factors. Give your answer in index form.

$$5^2 \times 7$$

7. Share £68 in the ratio 1:10:6

$$£68 \div 17 = £4$$

$$£4:£40:£24$$

8. Write down the gradient of the line whose equation is

$$y = 2(4x + 1)$$

$$8$$

9. Simplify $2x^7 \times 3x^4$

$$6x^{11}$$

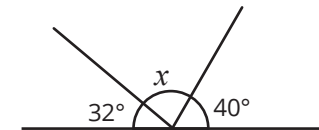
10. $y = 3x + 15$; what is the value of y when $x = 0.5$?

$$y = 3 \times 0.5 + 15 = 16.5$$

11. Find the area of a triangle whose width is 6cm and whose perpendicular height is 10cm.

$$6 \times 10 \div 2 = 30\text{cm}^2$$

12. Find the missing angle, marked x . Give a reason for your answer.



$$180 - (32 + 40) = 108^\circ, \text{ angles on a straight line add to } 180^\circ.$$