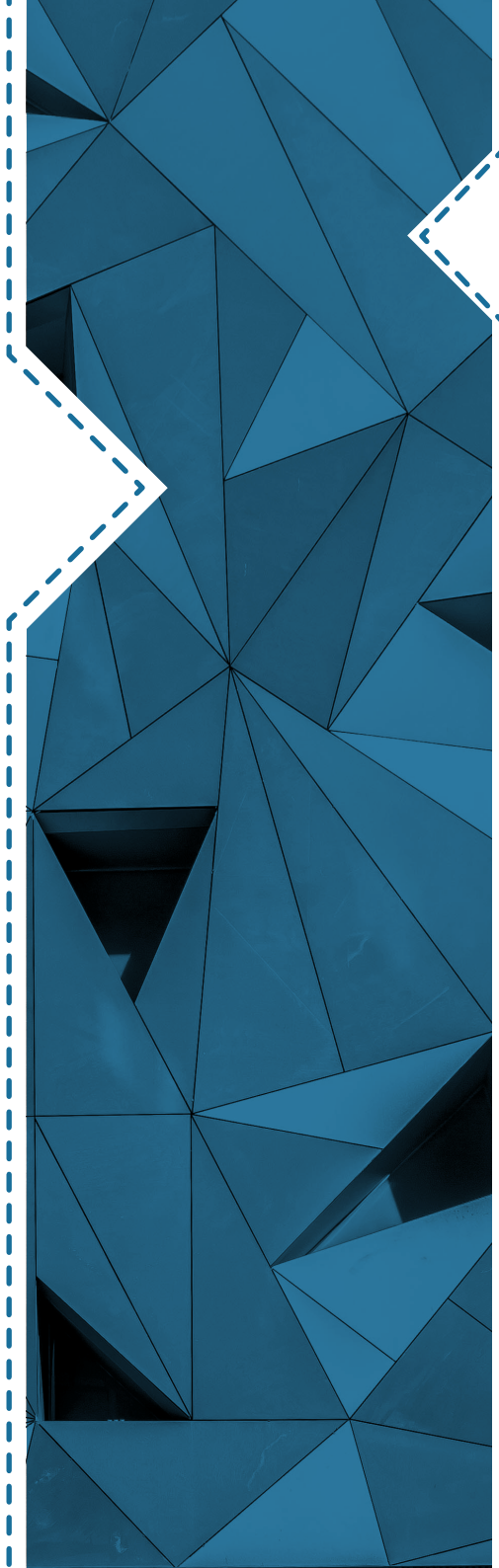


Non-Calculator
GCSE Maths
Revision
Higher
Booklet

1

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MATHS



Non-Calculator

GCSE Maths Revision Higher Booklet 1

Week 1.....page 1

Week 2.....page 5

Week 3.....page 9

Week 4.....page 13

Week 5.....page 17

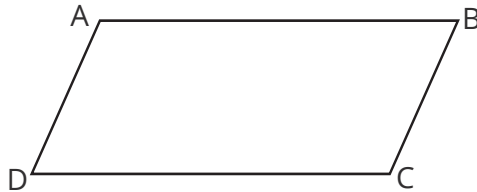
Week 6.....page 21

Week 7.....page 25

Question Number	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

1. A restaurant menu includes 3 starter options and 4 main course options. Assuming a customer chooses one of each, how many different ways are there for them to choose one starter and one main course?
2. Expand and simplify: $(x + 5)(x - 4)$
3. Fill in the gap using the correct inequality symbol: $\sqrt{20}$ ___ 4
4. Given that $f(x) = 7x + 2$, work out $f(-1)$.
5. Evaluate $9^{\frac{1}{2}}$.
6. Write $x^2 + 6x + 10$ in the form $(x + a)^2 + b$, where a and b are integers.
7. Simplify $\sqrt{75}$.
8. The equation of a circle is $x^2 + y^2 = 49$. What is the radius of this circle?
9. x is directly proportional to y . When $x = 4$, $y = 9$. Write an equation for y in terms of x .

10. 10 fish were captured from a pond, tagged and then released back into the pond. The next day, 20 fish were captured from the same pond. Of these 20 fish, 4 had tags on. Estimate the total population size of the fish.
11. A function is given by $y = f(x)$. Describe the single transformation that maps this function onto $y = f(x) + 2$.
12. The diagram shows a parallelogram ABCD. Prove that triangles ABC and ACD are congruent.

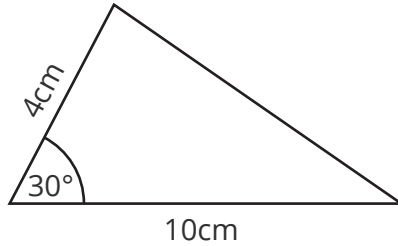


13. Use the iterative formula $x_{n+1} = 3x_n + 2$ with $x_1 = 0.5$ to find the value of x_2 .
14. The sides of a rectangle are enlarged by a scale factor of 2. Write down the scale factor that the area is enlarged by.
15. The first five terms of a quadratic sequence are 3, 9, 19, 33, 51. Find the n^{th} term of this sequence.
16. Write down the value of $\sin(0)$.
17. A bag contains red and yellow counters only. There are 8 red counters and 4 yellow counters. Ben chooses a counter at random and records the colour. He then replaces it and chooses another. Work out the probability that Ben chooses two red counters.
18. Work out the lower quartile of this list of numbers: 1, 2, 2, 3, 4, 5, 6

19. A line has equation $y = \frac{1}{2}x + 4$

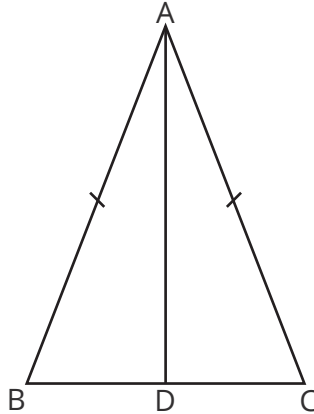
Write down the gradient of a line that runs perpendicular to this.

20. The diagram shows a non-right-angled triangle. Work out its area.



1. A restaurant menu includes 2 starter options, 5 main course options and 3 dessert options. Assuming a customer chooses one of each, how many different ways are there for them to choose one starter, one main course and one dessert?
2. Expand and simplify: $(2x + 3)(x - 1)$
3. Fill in the gap using the correct inequality symbol: $\sqrt{31}$ ____ 6
4. Given that $f(x) = 3x^2 - 1$, work out $f(-2)$.
5. Evaluate $64^{\frac{1}{3}}$.
6. Write $x^2 + 10x + 3$ in the form $(x + a)^2 + b$, where a and b are integers.
7. Simplify $\sqrt{200}$.
8. The equation of a circle is $x^2 + y^2 = 9$. Write down the coordinates of the centre of this circle.

9. x is directly proportional to y . When $x = 5$, $y = 2$. Write an equation for y in terms of x .
10. 40 fish were captured, tagged and then released. The next day, 100 fish were captured. Of these, 20 had tags. Estimate the total population size of the fish.
11. A function is given by $y = f(x)$. Describe the single transformation that maps this function onto $y = f(x - 1)$.
12. The diagram shows an isosceles triangle ABC . AD is perpendicular to BC . Prove that triangles ABD and ACD are congruent.

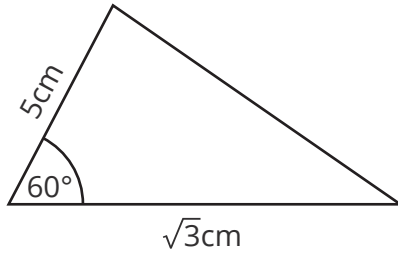


13. Use the iterative formula $x_{n+1} = \sqrt{x_n^2 + 2x_n}$ with $x_1 = 5$ to find the value of x_2 . Give your answer correct to 3 significant figures.
(Calculator allowed)
14. The sides of a cuboid are enlarged by a scale factor of 2. Write down the scale factor that the volume is enlarged by.
15. The first five terms of a quadratic sequence are 1, 10, 25, 46, 73. Find the n^{th} term of this sequence.
16. Write down the value of $\cos(30^\circ)$.
17. A bag contains red and yellow counters only. There are 5 red counters and 6 yellow counters. Ben chooses a counter at random and records the colour. He then replaces it and chooses another. Work out the probability that Ben chooses two counters of different colour.
18. Work out the upper quartile of this list of numbers:
1, 2, 2, 3, 4, 5, 6, 9, 10, 11, 15

19. A line has equation $y = 3x + 7$

Write down the gradient of a line that runs perpendicular to this.

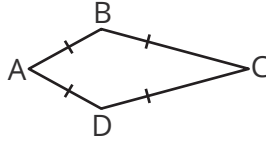
20. The diagram shows a non-right-angled triangle. Work out its area.



1. Harry has a combination lock. The lock uses 4 digits. Each digit takes a number between 0 and 9 inclusive. How many different ways can this lock be set?
2. Expand and simplify: $(3x + 5)^2$
3. Estimate the value of $\sqrt{40}$
4. Given that $f(x) = 5x - 4$, work out $f^{-1}(x)$.
5. Evaluate $8^{\frac{2}{3}}$.
6. By writing $x^2 + 6x + 3$ in the form $(x + a)^2 + b$, where a and b are integers, solve the equation $x^2 + 6x + 3 = 0$. Give your answers in surd form.

7. Write $\sqrt{48}$ in the form $a\sqrt{b}$ where a and b are integers.
8. The equation of a circle is $x^2 + y^2 = 9$. Does the point $(1, 2)$ lie on the circumference of this circle? Give a reason for your answer.
9. x is directly proportional to y . When $x = 5, y = 3$. Work out the value of y when $x = 9$.
10. 40 fish were captured, tagged and then released. The next day, 100 fish were captured. Of these, 20 had tags. Callum uses this information to estimate the total population of fish. Write down two assumptions he must make.
11. A function is given by $y = f(x)$. Describe the single transformation that maps this function onto $y = -f(x)$.

12. The diagram shows a kite ABCD. Prove that triangles ABC and ADC are congruent.



13. Use the iterative formula $x_{n+1} = 7 - \frac{3}{x_n}$ with $x_0 = 1$ to find the value of x_1 , x_2 and x_3 .
(Calculator allowed)
14. The sides of a cuboid are enlarged by a scale factor of 4. Write down the scale factor that the surface area is enlarged by.
15. The first five terms of a quadratic sequence are 5, 14, 27, 44, 65. Find the n^{th} term of this sequence.
16. Write down the value of $\tan(45^\circ)$.

17. A bag contains red and yellow counters only. There are 5 red counters and 6 yellow counters. Ben chooses a counter at random and records the colour. He then replaces it and chooses another. Work out the probability that Ben chooses at least one red counter.

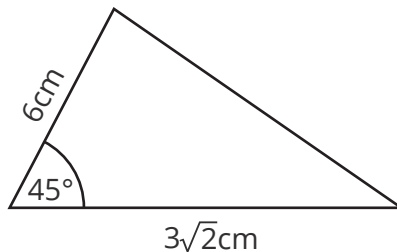
18. Work out the interquartile range of this list of numbers:

3, 7, 8, 9, 9, 11, 13

19. A line has equation $2y = x + 5$

Write down the gradient of a line that runs perpendicular to this.

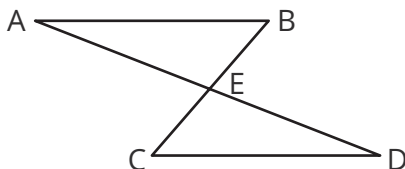
20. The diagram shows a non-right-angled triangle. Work out its area.



1. Harry has a combination lock. The lock uses 4 digits. Each digit takes a number between 0 and 9 inclusive. How many different ways can this lock be set, given that Harry wants the code to be even?
2. Expand and simplify: $(4x - 1)^2$
3. Estimate the value of $\sqrt{70}$
4. Given that $f(x) = \frac{3x+1}{2}$, work out $f^{-1}(x)$.
5. Evaluate $9^{\frac{3}{2}}$.
6. By writing $x^2 - 4x + 1$ in the form $(x + a)^2 + b$, where a and b are integers, solve the equation $x^2 - 4x + 1 = 0$. Give your answers in surd form.

7. Write $\sqrt{8} + \sqrt{50}$ in the form $a\sqrt{b}$ where a and b are integers.
8. The equation of a circle is $x^2 + y^2 = 13$. Does the point $(3, 2)$ lie on the circumference of this circle? Give a reason for your answer.
9. x is directly proportional to y . When $x = 4$, $y = 7$. Work out the value of y when $x = 12$.
10. A farmer captures 80 mice on his farm. He tags them and then releases them back onto the farm. The next day, he captures 200 mice. Of these, 50 have tags. Estimate the total population size of the mice.
11. A function is given by $y = f(x)$. Describe the single transformation that maps this function onto $y = f(-x)$.

12. In the diagram, the lines AB and CD are parallel and $AB = CD$. Lines BC and AD intersect at point E. Prove that triangles ABE and CDE are congruent.



13. Use the iterative formula $x_{n+1} = 7 - \frac{3}{x_n}$ with $x_1 = 1$ to solve the equation $x = 7 - \frac{3}{x}$, giving your answer correct to three decimal places.

(Calculator allowed)

14. The sides of a cuboid are enlarged by a scale factor of 4. Write down the scale factor that the volume is enlarged by.
15. The first five terms of a quadratic sequence are 3, 12, 25, 42, 63. Find the n^{th} term of this sequence.
16. Write down the value of $\cos(45^\circ)$.

17. A bag contains red and yellow counters only. There are 5 red counters and 6 yellow counters. Ben chooses a counter at random and records the colour. He then chooses another without replacing the first. Work out the probability that Ben chooses two red counters.

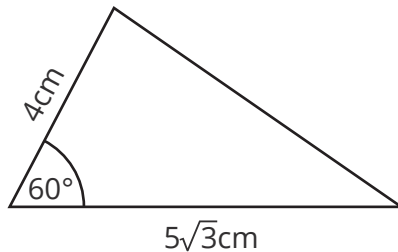
18. Work out the interquartile range of this list of numbers:

15, 8, 4, 5, 19, 2, 10

19. A line has equation $2y - x = 3$

Write down the gradient of a line that runs perpendicular to this.

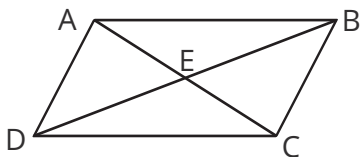
20. The diagram shows a non-right-angled triangle. Work out its area.



1. Kelly thinks of a three-digit number greater than or equal to 700. Given that the number is a multiple of 5, calculate the total amount of numbers Kelly could be thinking of.
2. Expand and simplify: $(x + 1)(x + 2)(x + 3)$
3. Estimate the value of $\sqrt[3]{52}$
4. Given that $f(x) = x + 2$ and $g(x) = 3x - 1$, work out $f \circ g(x)$.
5. Evaluate $1000^{\frac{2}{3}}$.
6. By writing $x^2 + x - 1$ in the form $(x + a)^2 + b$, where a and b are rational numbers, solve the equation $x^2 + x - 1 = 0$. Give your answers in surd form.

7. Write $\sqrt{45} + 2\sqrt{20}$ in the form $a\sqrt{b}$ where a and b are integers.
8. The equation of a circle is $x^2 + y^2 = 13$. Find the equation of the radius of the circle that passes through the point $(3, 2)$.
9. x is inversely proportional to y . When $x = 9$, $y = 2$. Work out the value of y when $x = 4$.
10. On Monday, Lily captured 320 trout, tagged them and then released them. On Tuesday, Lily captured 500 trout and recorded the number which were tagged. She uses the information to estimate the total amount of trout as 8000. How many trout did Lily record as tagged on Tuesday?
11. A function is given by $y = f(x)$. The graph of $y = f(x)$ passes through the point P with coordinates $(1, 2)$. The function is mapped onto $y = f(x + 5)$. Write down the new coordinates of point P.

12. ABCD is a parallelogram. The diagonals of the parallelogram meet at point E. Prove that triangle ABE is congruent to triangle CDE.



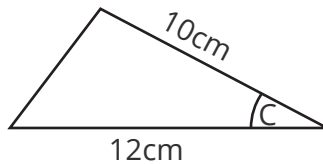
13. Use the iterative formula $x_{n+1} = \frac{1-x_n^2}{5}$ with $x_1 = 0.5$ to solve the equation $x^2 + 5x - 1 = 0$, giving your answer correct to three decimal places.

(Calculator allowed)

14. A cylinder has a radius of 2cm and a surface area of 10cm^2 . A similar cylinder has a radius of 4cm. Calculate its surface area.
15. The first five terms of a quadratic sequence are -3, -3, 1, 9, 21. Find the n^{th} term of this sequence.
16. Evaluate $\sin(60^\circ) \times \cos(30^\circ)$.

17. A bag contains red and yellow counters only. There are 5 red counters and 6 yellow counters. Ben chooses two counters at random and records the colours. Work out the probability that Ben chooses two counters of the same colour.
18. Work out the lower quartile of this list of numbers: 3, 4, 1, 2, 9
19. Find the equation of the line parallel to $y = 2x + 1$ that passes through (1, 1).

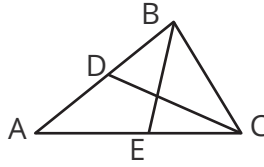
20. The diagram shows a non-right-angled triangle. Its area is $30\sqrt{3}$ square units. Find the size of angle C.



1. A menu has a choice of 3 starters, 4 main courses and 2 desserts. How many different ways are there to choose a two-course meal (starter and main or main and dessert)?
2. Expand and simplify: $(x - 3)(x + 4)(x - 5)$
3. Estimate the value of $\sqrt[3]{100}$
4. Given that $f(x) = x^2$ and $g(x) = x + 2$, work out $fg(x)$.
5. Evaluate $64^{\frac{3}{2}}$.
6. By writing $x^2 + 3x - 1$ in the form $(x + a)^2 + b$, where a and b are rational numbers, find the coordinates of the turning point of the curve $y = x^2 + 3x - 1$
7. Rationalise the denominator of $\frac{10}{\sqrt{5}}$

8. The equation of a circle is $x^2 + y^2 = 13$. Find the equation of the tangent to the circle that passes through the point (3, 2).
9. x is inversely proportional to y . When $x = 3$, $y = 4$. Work out the value of x when $y = 10$.
10. On Monday, Lily captured 70 trout, tagged them and then released them. On Tuesday, Lily captured 120 trout and recorded the number which were tagged. She uses the information to estimate the total amount of trout as 210. How many trout did Lily record as tagged on Tuesday?
11. A function is given by $y = f(x)$. The graph of $y = f(x)$ passes through the point P with coordinates (1, 2). The function is mapped onto $y = -f(x) + 2$. Write down the new coordinates of point P.

12. In the diagram, $AB = AC$. D is the midpoint of AB and E is the midpoint of AC. Prove that triangle ABE is congruent to triangle ACD.



13. Show that the equation $x^4 - 4x + 2 = 0$ has a solution in the interval $[0, 1]$.
14. A cylinder has a radius of 2cm and a volume of 30cm^3 . A similar cylinder has a radius of 6cm. Calculate its volume.
15. The first five terms of a quadratic sequence are 3, 8, 15, 24, 35. Find the 50th term of this sequence.
16. Which of these cannot be the sine of an angle? $0.5, \frac{\sqrt{3}}{2}, 4, -1$

17. A biscuit tin contains 4 chocolate and 8 plain biscuits only. Alex chooses two biscuits at random. Work out the probability that at least one of these biscuits is plain.
18. Work out the upper quartile of this list of numbers: 3, 4, 1, 2, 9
19. Find the equation of the line perpendicular to $y = 2x + 1$ that passes through (1, 1).
20. The diagram shows a non-right-angled isosceles triangle. Its area is 9 square units. Calculate the value of x .



1. A hotel has five rooms to allocate to five separate guests. How many different ways are there for the hotel to do this?

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

3. Estimate the value of $\sqrt{\frac{10}{24}}$, giving your answer as a fraction.

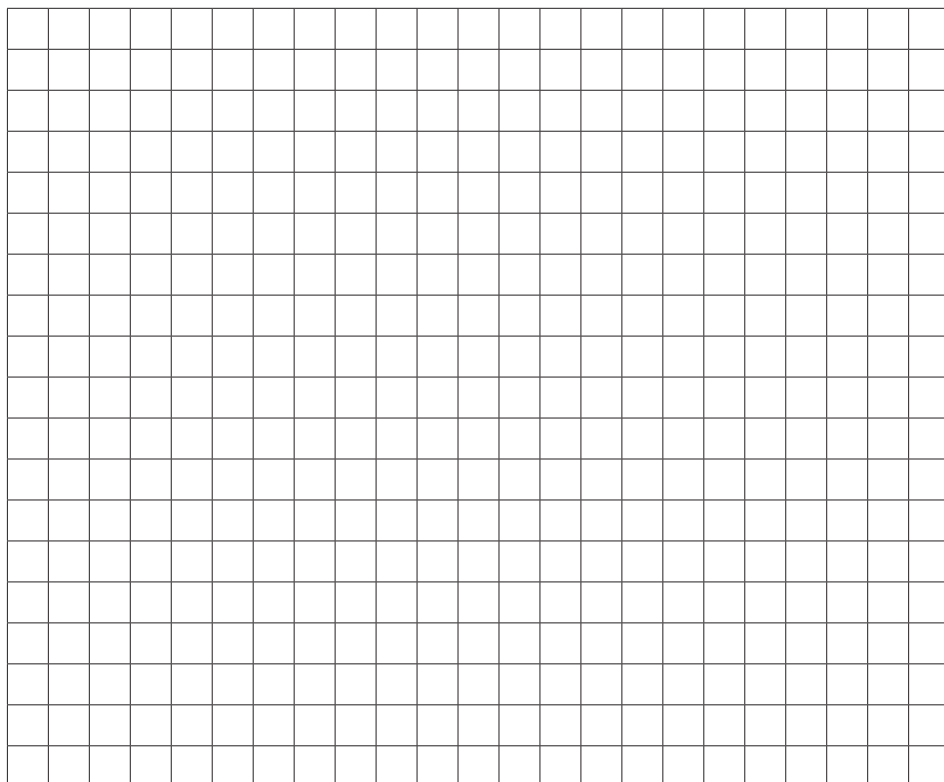
4. Given that $f(x) = x^2 + 3$ and $g(x) = 2x - 1$, work out $fg(5)$.

5. Evaluate $\left(\frac{9}{16}\right)^{\frac{3}{2}}$.

- 6a. By writing $x^2 + 4x - 3$ in the form $(x + a)^2 + b$, where a and b are integers, find the coordinates of the turning point of the curve $y = x^2 + 4x - 3$

6b. Solve the equation $x^2 + 4x - 3 = 0$, giving your answers in surd form.

6c. Hence, sketch the graph of $y = x^2 + 4x - 3$



7. Rationalise the denominator of $\frac{3}{1 + \sqrt{2}}$

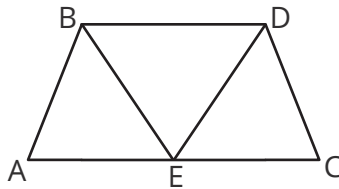
8. The equation of a circle is $x^2 + y^2 = 17$. Find the equation of the tangent to the circle that passes through the point $(-1, 4)$.
9. A is directly proportional to the square of b . When $A = 5$, $b = 2$. Given that $b > 0$, find the value of b when $A = 11.25$.
10. On Monday, Lily captured some trout from a pond, tagged them and then released them back into the pond.

On Tuesday, Lily captured 20 less trout than on Monday. She found that 10 of these trout were tagged.

She uses the information to estimate the total amount of trout and finds that this is three times the amount of trout she caught on Monday. How many trout did Lily record as tagged on Tuesday?

11. A function is given by $y = f(x)$. The graph of $y = f(x)$ passes through the point P with coordinates (1, 2). The function is mapped onto $y = f(x + 4) - 1$. Write down the new coordinates of point P.

12. ABCD is a trapezium such that $AB = CD$. E is the midpoint of AC. Prove that triangle ABE is congruent to triangle DCE.



13. The equation $x^4 - 4x + 2 = 0$ has a solution in the interval $[0, 1]$.
- a. Show that the equation can be written as $x = \sqrt[3]{4 - \frac{2}{x}}$

- b. Use the iterative formula: $x_{n+1} = \sqrt[3]{4 - \frac{2}{x_n}}$ with $x_0 = 1$ to find a solution to the equation $x^4 - 4x + 2 = 0$, giving your answer correct to 2 decimal places.
14. A cylinder has a surface area of 12cm^2 and a volume of 20cm^3 . A similar cylinder has a surface area of 48cm^2 . Calculate its volume.
15. The first five terms of a quadratic sequence are -1, -13, -33, -61, -97. Find the 50th term of this sequence.
16. Which of these cannot be the cosine of an angle?
 $0.3, \frac{\sqrt{2}}{2}, -0.5, -3$
17. A biscuit tin contains 4 chocolate and 8 plain biscuits only. Alex chooses three biscuits at random. Work out the probability that all three biscuits are plain.

18. Work out the interquartile range of this list of numbers:

3, 5, 1, 2, 9, 2, 9, 0, 1

19. Find the equation of the line perpendicular to $3y = x - 4$ that passes through $(1, 2)$.

20. The diagram shows a non-right-angled isosceles triangle. Its area is 12 square units. Calculate the value of x , giving your answer as a surd in its simplest form.

