

YEAR 9 — SUMMER MATHS

KS3 into GCSE — key skills consolidation

Name: _____

Skills covered: Arc length & sector area, Calculating with surds, Compound measures (speed/density/pressure), Direct & inverse proportion, Error intervals, Expanding brackets, Factorising, Forming & using formulae, Indices, Inequalities, Parts of a circle, Probability, Pythagoras' theorem, Similar shapes, Simplifying surds, Simultaneous equations, Standard form, Straight-line graphs, Surface area, Tree diagrams, Venn diagrams, nth term of quadratic sequences

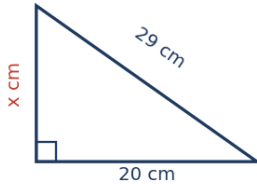
How to use this booklet

- Complete three tasks each week.
- Each task has five questions that get harder as you go.
- Show all your working clearly.
- Mark your work using the answer key at the back after each task.
- If you get stuck, move on and return to it later.

WEEK 1

Task 1

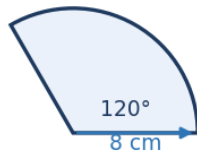
1. Work out 5^2
2. Expand and simplify $(x + 6)(x + 4)$
3. y is directly proportional to x . When $x = 3$, $y = 9$. Find y when $x = 4$.
4. Work out the length of the side marked x .



5. A bag has 3 red and 7 blue counters. Two are taken without replacement. Find the probability both are red.

Task 2

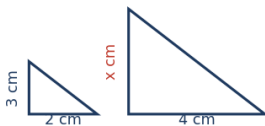
1. Write 320000 in standard form.
2. Factorise $x^2 + 5x$
3. A car travels 210 km in 3 hours. Work out its average speed.
4. Work out the area of this sector. ($\pi = 3.14$, 1 dp)



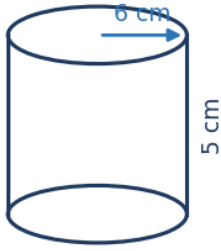
5. A fair six-sided die is rolled. Find $P(\text{a number greater than 4})$.

Task 3

1. A length is 59.7 cm to 1 decimal place. Write the error interval.
2. Solve $2x + 7 < 21$
3. These two triangles are similar. Work out the length x .



4. Work out the curved surface area of this cylinder. Give your answer in terms of π .

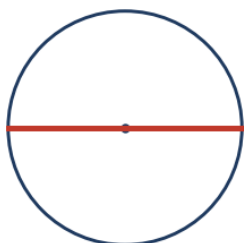


5. In a group of 29, 14 like tea, 16 like coffee and 9 like both. One person is chosen at random. Find the probability they like tea only.

WEEK 2

Task 1

1. Is $\sqrt{25}$ rational or irrational?
2. Tickets cost £8 each plus a £2 booking fee. Write a formula for the total cost £C of n tickets.
3. Name the part of the circle shown in **bold**.



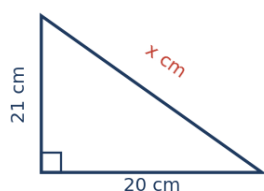
4. Work out $\sqrt{3} \times \sqrt{12}$
5. Find the equation of the line through (2, -1) and (3, 2).

Task 2

1. Find the nth term of the quadratic sequence 2, 5, 10, 17, ...
2. Solve the simultaneous equations: $2x + y = 14$ and $2x - y = 10$
3. Work out 4^{-2}
4. Expand and simplify $(x + 3)(x - 4)$
5. y is inversely proportional to x. When $x = 3$, $y = 12$. Find y when $x = 2$.

Task 3

1. Work out the length of the hypotenuse, x.

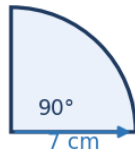


2. $P(A) = 2/5$ and $P(B) = 1/3$, independent. Find $P(A \text{ and } B)$.
3. Work out (in standard form): $(2 \times 10^4) \times (2 \times 10^2)$
4. Factorise $x^2 + 5x + 6$
5. An object has mass 360 g and volume 50 cm^3 . Work out its density.

WEEK 3

Task 1

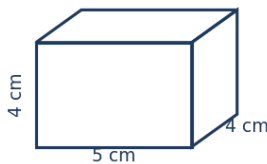
1. Work out the arc length of this quarter circle. ($\pi = 3.14$, 1 dp)



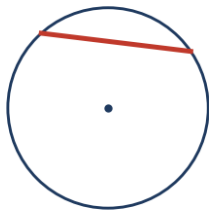
2. A fair six-sided die is rolled. Find $P(\text{an even number})$.
3. A number is 47 to the nearest whole number. Write the error interval.
4. Solve $4x - 4 \geq 12$
5. Two similar solids have length scale factor 2. The smaller has volume 9 cm^3 . Work out the volume of the larger solid.

Task 2

1. Work out the surface area of this cuboid.



2. In a group of 36, 20 like tea, 12 like coffee and 8 like both. One person is chosen at random. Find the probability they like tea only.
3. Simplify $\sqrt{98}$
4. Using $C = 5n + 1$, find C when $n = 4$.
5. Name the part of the circle shown in bold.



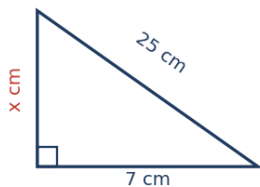
Task 3

1. Simplify $4\sqrt{3} + 2\sqrt{3} - \sqrt{3}$
2. Find the equation of the line through (0, 1) and (1, 3).
3. Find the n th term of the quadratic sequence 6, 16, 30, 48, ...
4. Solve the simultaneous equations: $2x + y = 8$ and $4x + 2y = 16$
5. Work out $2^3 + \sqrt{49}$

WEEK 4

Task 1

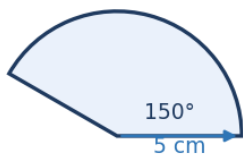
1. Expand and simplify $(x + 2)^2$
2. y is inversely proportional to x . When $x = 2$, $y = 18$. Find y when $x = 6$.
3. Work out the length of the side marked x .



4. A bag has 3 red and 4 blue counters. Two are taken without replacement. Find the probability they are different colours.
5. Work out (in standard form): $(6 \times 10^8) \div (3 \times 10^4)$

Task 2

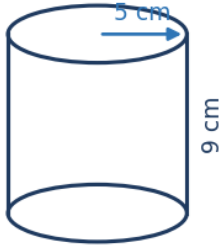
1. Factorise $x^2 + 9x + 18$
2. An object has mass 150 g and volume 50 cm^3 . Work out its density.
3. Work out the area of this sector. ($\pi = 3.14$, 1 dp)



4. A bag has 3 red, 5 blue and 2 green counters. Find $P(\text{red})$.
5. A mass is 40 g to the nearest 10 g. Write the error interval.

Task 3

1. Solve $3x - 4 \geq 14$
2. Two shapes are similar. The length scale factor is 3. The smaller shape has area 9 cm^2 . Work out the area of the larger shape.
3. Work out the curved surface area of this cylinder. Give your answer in terms of π .

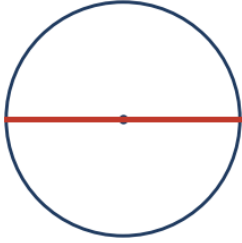


4. 31 pupils: 14 play football, 18 play netball, 8 play both. Find the probability a random pupil plays exactly one of these sports.
5. Simplify $\sqrt{108}$

WEEK 5

Task 1

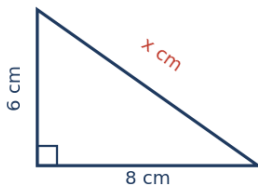
1. Using $C = 5n + 4$, find C when $n = 5$.
2. Name the part of the circle shown in **bold**.



3. Simplify $\sqrt{5}(2 + \sqrt{5})$
4. A line is perpendicular to $y = 3x + 1$ and passes through $(3, 1)$. Find its equation.
5. Find the n th term of the quadratic sequence 6, 11, 18, 27, ...

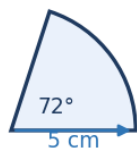
Task 2

1. Solve the simultaneous equations: $3x + y = 21$ and $4x + 2y = 30$
2. Work out 2^{-3}
3. Expand and simplify $(2x + 4)(x + 6)$
4. y is directly proportional to x . When $x = 5$, $y = 20$. Write a formula for y in terms of x .
5. Work out the length of the hypotenuse, x . Give your answer to 1 dp.



Task 3

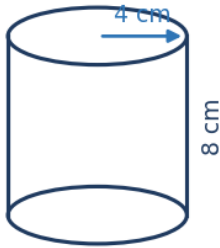
1. A bag has 3 red and 6 blue counters. Two are taken without replacement. Find the probability both are red.
2. Work out (in standard form): $(4 \times 10^4) \times (2 \times 10^2)$
3. Factorise $x^2 - 36$
4. A force of 50 N acts on an area of 4 m^2 . Work out the pressure.
5. Work out the arc length of this sector. ($\pi = 3.14$, 1 dp)



WEEK 6

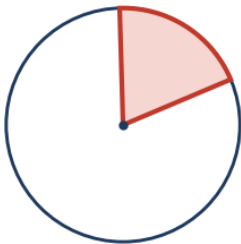
Task 1

1. A fair six-sided die is rolled. Find $P(\text{a number less than 3})$.
2. A mass is 70 g to the nearest 10 g. Write the error interval.
3. List all the integers that satisfy $-3 < x \leq 3$.
4. Two similar solids have length scale factor 2. The smaller has volume 15 cm^3 . Work out the volume of the larger solid.
5. Work out the total surface area of this cylinder. Give your answer in terms of π .



Task 2

1. In a group of 39, 20 like tea, 16 like coffee and 5 like both. One person is chosen at random. Find the probability they like tea only.
2. Simplify $\sqrt{288}$
3. The perimeter of a rectangle is $P = 2(l + w)$. Find w when $P = 28$ and $l = 7$.
4. Name the part of the circle shown in bold.



5. Simplify $10/\sqrt{5}$

Task 3

1. Find the equation of the line through (0, 2) and (1, 5).
2. Find the n th term of the quadratic sequence 5, 13, 25, 41, ...
3. Solve the simultaneous equations: $3x + 2y = 18$ and $3x + 4y = 24$
4. Work out $\sqrt{81} + 2^3$
5. Expand and simplify $(3x + 5)(x + 2)$

ANSWERS

Mark each task as you finish it.

Week 1

Task 1: 1) 25 2) $x^2 + 10x + 24$ 3) $y = 12$ 4) 21 cm 5) $1/15$

Task 2: 1) 3.2×10^5 2) $x(x + 5)$ 3) 70 km/h 4) 67.0 cm^2 5) $2/6 = 1/3$

Task 3: 1) $59.65 \leq \text{length} < 59.75$ 2) $x < 7$ 3) 6 cm 4) $60\pi \text{ cm}^2$ 5) $5/29$

Week 2

Task 1: 1) rational (= 5) 2) $C = 8n + 2$ 3) diameter 4) 6 5) $y = 3x - 7$

Task 2: 1) $n^2 + 1$ 2) $x = 6, y = 2$ 3) $1/16$ 4) $x^2 - 1x - 12$ 5) $y = 18$

Task 3: 1) 29 cm 2) $2/15$ 3) 4×10^6 4) $(x + 3)(x + 2)$ 5) 7.2 g/cm^3

Week 3

Task 1: 1) 11.0 cm 2) $3/6 = 1/2$ 3) $46.5 \leq \text{number} < 47.5$ 4) $x \geq 4$ 5) 72 cm^3

Task 2: 1) 112 cm^2 2) $1/3$ 3) $7\sqrt{2}$ 4) 21 5) chord

Task 3: 1) $5\sqrt{3}$ 2) $y = 2x + 1$ 3) $2n^2 + 4n$ 4) $x = 2, y = 4$ 5) 15

Week 4

Task 1: 1) $x^2 + 4x + 4$ 2) $y = 6$ 3) 24 cm 4) $4/7$ 5) 2×10^4

Task 2: 1) $(x + 3)(x + 6)$ 2) 3 g/cm^3 3) 32.7 cm^2 4) $3/10$ 5) $35 \leq \text{mass} < 45$

Task 3: 1) $x \geq 6$ 2) 81 cm^2 3) $90\pi \text{ cm}^2$ 4) $16/31$ 5) $6\sqrt{3}$

Week 5

Task 1: 1) 29 2) diameter 3) $2\sqrt{5} + 5$ 4) $y = -1/3 x + 2$ 5) $n^2 + 2n + 3$

Task 2: 1) $x = 6, y = 3$ 2) $1/8$ 3) $2x^2 + 16x + 24$ 4) $y = 4x$ 5) 10.0 cm

Task 3: 1) $1/12$ 2) 8×10^6 3) $(x + 6)(x - 6)$ 4) 12.5 Pa 5) 6.3 cm

Week 6

Task 1: 1) $2/6 = 1/3$ 2) $65 \leq \text{mass} < 75$ 3) -2, -1, 0, 1, 2, 3 4) 120 cm^3 5) $96\pi \text{ cm}^2$

Task 2: 1) $5/13$ 2) $12\sqrt{2}$ 3) 7 4) sector 5) $2\sqrt{5}$

Task 3: 1) $y = 3x + 2$ 2) $2n^2 + 2n + 1$ 3) $x = 4, y = 3$ 4) 17 5) $3x^2 + 11x + 10$