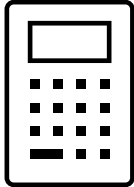


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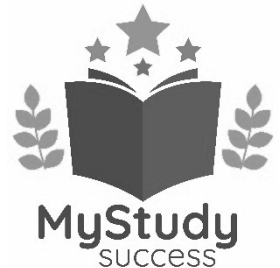
Forename(s):

GCSE Mathematics – Higher Tier

Paper 3 – Calculator



Practice Set D



Materials

- **Formulae Sheet** (on the next page)
- **Black** ink or ball-point pen
- Pencil
- Eraser
- Protractor
- Compass
- Tracing Paper
- **Calculator allowed**

/40

Instructions

- Time allowed: **45 minutes**.
- The total mark for this paper is **40**.
- Show **all** of your working.
- Draw diagrams in pencil.
- Plot graphs in pencil.
- Diagrams are **not** accurately drawn, unless otherwise indicated.
- Cross through any work you don't want to be marked

Higher Tier Formulae Sheet

Perimeter, Area and Volume

Where a and b are the lengths of the parallel sides and h is their perpendicular separation:

Area of a trapezium = $\frac{1}{2}(a + b)h$

Volume of a prism = area of cross section $\times$ length

Where r is the radius and d is the diameter:

Circumference of a circle = $2\pi r = \pi d$

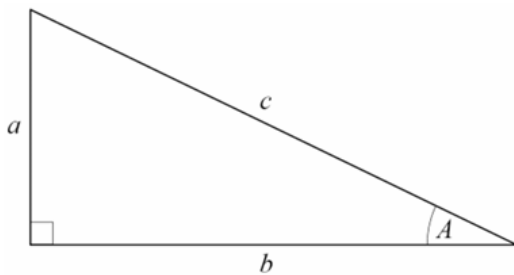
Area of a circle = πr^2

Quadratic Formula

The solution of $ax^2 + bx + c = 0$ where $a \neq 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Pythagoras' Theorem and Trigonometry

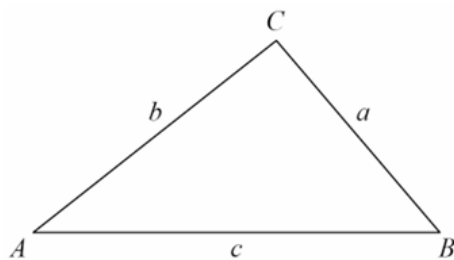


In any right-angled triangle where a , b and c are the length of the sides and c is the hypotenuse:

$$a^2 + b^2 = c^2$$

In any right-angled triangle ABC where a , b and c are the length of the sides and c is the hypotenuse:

$$\sin A = \frac{a}{c} \quad \cos A = \frac{b}{c} \quad \tan A = \frac{a}{b}$$



In any triangle ABC where a , b and c are the length of the sides:

$$\text{sine rule: } \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\text{cosine rule: } a^2 = b^2 + c^2 - 2bc \cos A$$

$$\text{Area of triangle} = \frac{1}{2}ab \sin C$$

Compound Interest

Where P is the principal amount, r is the interest rate over a given period and n is number of times that the interest is compounded:

$$\text{Total accrued} = P \left(1 + \frac{r}{100} \right)^n$$

Probability

Where $P(A)$ is the probability of outcome A and $P(B)$ is the probability of outcome B :

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$P(A \text{ and } B) = P(A \text{ given } B)P(B)$$

- 1 A company has 18,000 employees.
The number of employees increases by a rate of 4.5% per year for 3 years.

Calculate the total number of employees at the end of the 3 years.

(Total for question 1 is 3 marks)

-
- 2 A and B are numbers such that

$$A = 3^3 \times 5 \times 7^2$$

$$B = 2^4 \times 3^2 \times 7$$

(a) Find the highest common factor (HCF) of A and B.

(1)

(a) Find the lowest common multiple (LCM) of A and B.

(2)

(Total for question 2 is 3 marks)

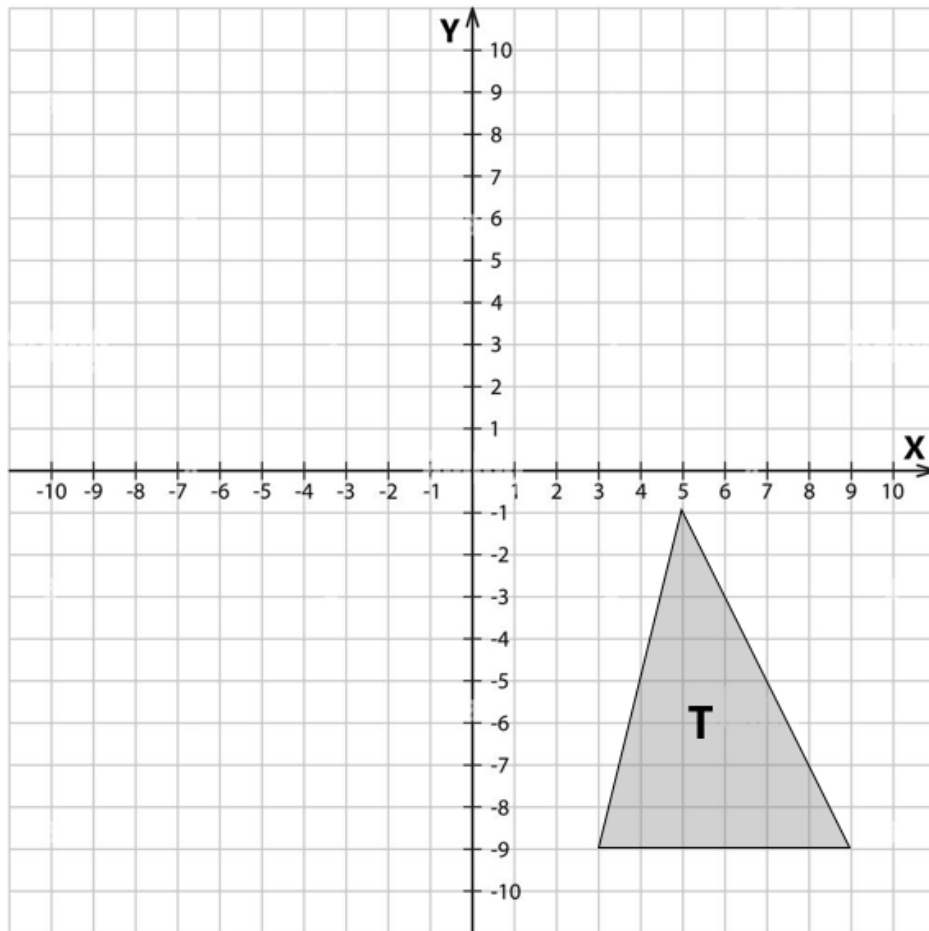
- 3 The density of apple juice is 1.12 grams per ml
The density of orange juice is 1.02 grams per ml

465ml of apple juice is mixed with 285ml of orange juice to make a mixed fruit drink.
Work out the density of the mixed fruit drink
Give your answer to 2 decimal places.

_____ g/ml

(Total for question 3 is 4 marks)

4



(a) Enlarge triangle T by scale factor $-\frac{1}{2}$, centre $(-1, 1)$

Label this shape as triangle U.

(2)

(b) Translate triangle T by the vector $\begin{pmatrix} -7 \\ 2 \end{pmatrix}$

Label this shape as triangle V

(2)

(Total for question 4 is 4 marks)

5 (a) Simplify fully $2x^2\left(9 + \frac{4}{x}\right) - 3x(6x + 5) + 7x\left(1 + \frac{5}{x}\right)$

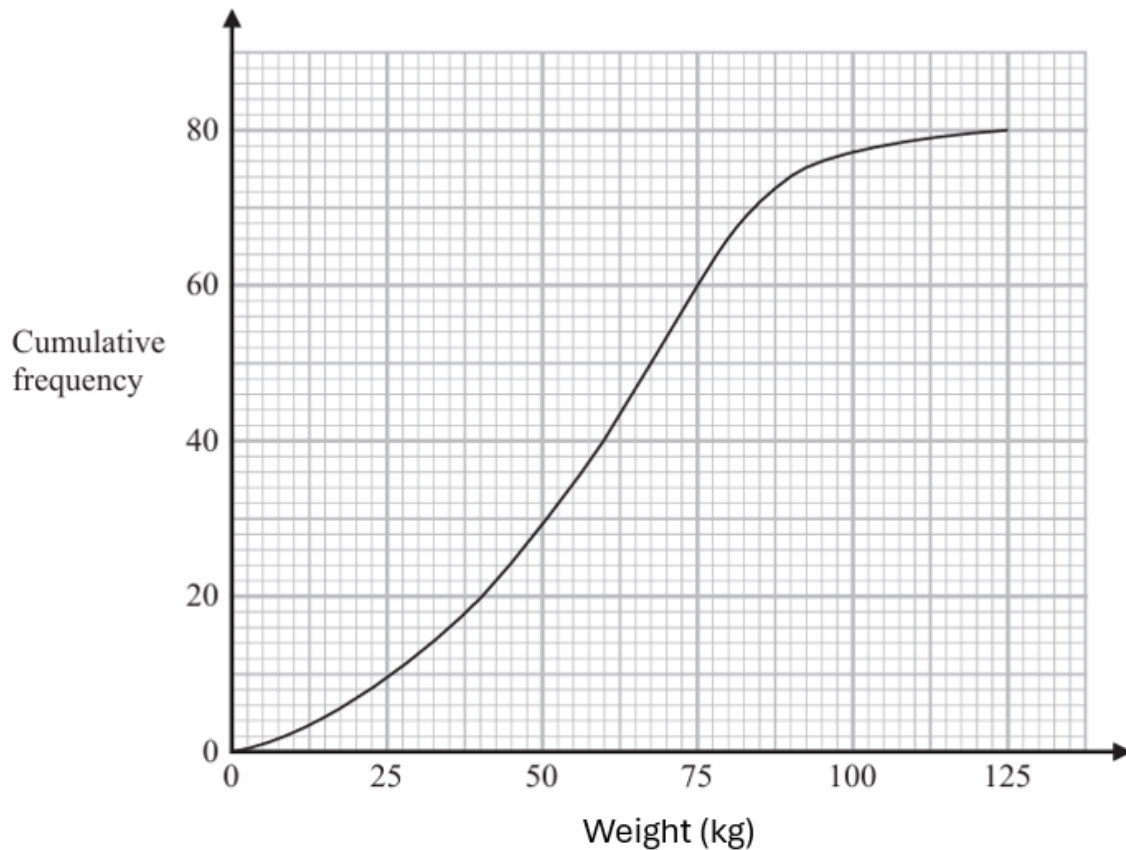
(b) Simplify fully $\frac{2x + 10}{x - 2} \div \frac{x^2 - 25}{3x - 6}$

(3)

(3)

(Total for question 5 is 6 marks)

- 7 There are 80 pandas in a northern animal conservation centre.
The cumulative frequency graph shows information about the weights, in kilograms, of these pandas.



One of the pandas are chosen at random.

- (a) Find an estimate for the probability that this panda will have a weight greater than 90kg.

_____ (2)

- (b) Use the graph to find an estimate for the median weight.

_____ kg (1)

- (c) Use the graph to find an estimate for the interquartile range of the weights.

_____ kg (2)

(Total for question 7 is 5 marks)

8 $w = \sqrt{\frac{2x}{y}}$

$x = 255$ correct to the nearest 5.

$Y = 6.2$ correct to 1 decimal place.

Work out the lower bound for the value of w .

Give your answer correct to 3 significant figures.

You must show your working.

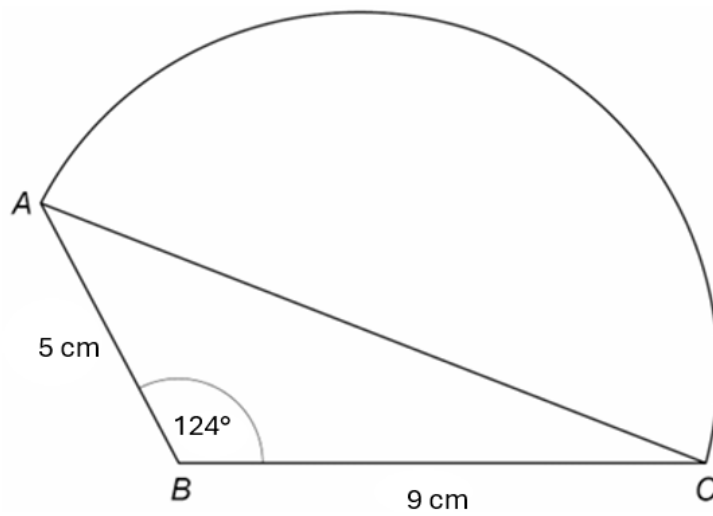
(Total for question 8 is 3 marks)

9 A circle has centre $(0, 0)$ and passes through the point $(16, 0)$

Write down the equation of the circle.

(Total for question 9 is 1 mark)

10 A shape is made by connecting triangle ABC to a semicircle with diameter AC.

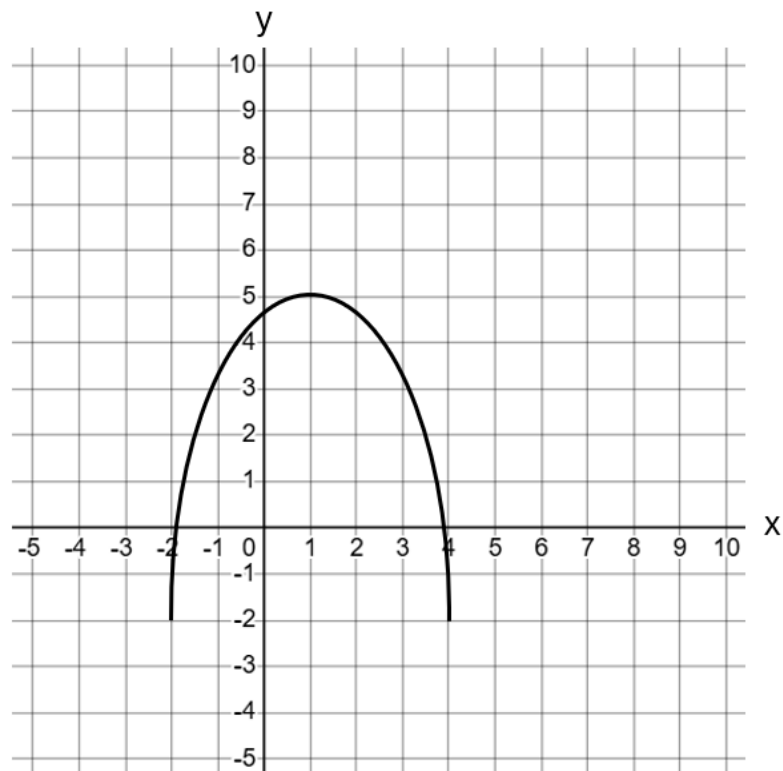


Work out the total area of the shape.

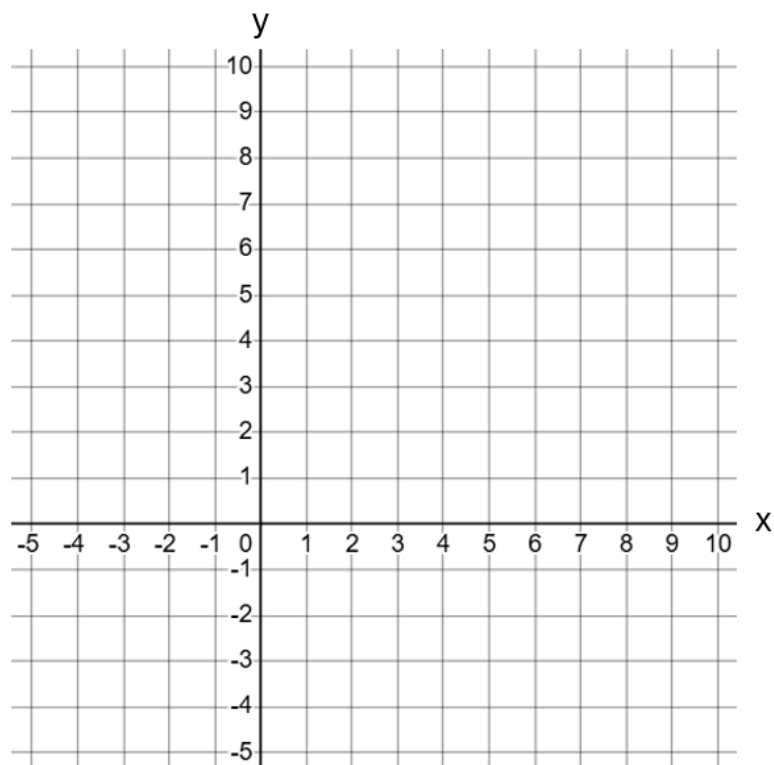
Give your answer correct to the nearest whole number.

_____ cm²
(Total for question 10 is 5 marks)

11 The graph of $y = f(x)$ is shown on the grid.



On the grid below, sketch the graph of $y = f(x - 2)$



(Total for question 11 is 1 mark)

12 Point A has coordinates (-4 , 5)

Point B has coordinates (12 , 9)

M is the midpoint of AB

Line L passes through point M and is perpendicular to the line AB.

Find an equation for line L in the form $y = mx + c$

(Total for question 12 is 5 marks)

END OF TEST

TOTAL FOR THIS PAPER IS 40 MARKS