

GCSE MATHEMATICS (9-1) — EXAM PRACTICE WORKBOOK

Grade 6 Mathematics — Practice Questions

(Higher Tier)

Higher Tier Exam Practice, Calculator Tags, 2 Mixed Review Papers & Full Answer Key

- 6 Edexcel Higher Exam-Style Questions per topic with mark allocations
- Calculator & Non-Calculator Badges on every single question
- 2 Interleaved Mixed Review Sets (Paper 1 & Paper 2/3 method selection)
- Structured Working Spaces & Topic-Linked Answer Key Appendix

Student Name: _____

Class / Teacher: _____

Target Grade: _____



SCAN FOR ONLINE PRACTICE & WORKED SOLUTIONS

BreakingDownMaths.com

Interactive Step-by-Step GCSE Mathematics Mastery

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Click any topic to jump straight there. Complete both Mixed Review Sets before checking the Answer Key Appendix.

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MIXED EXAM REVIEW (PICK THE RIGHT METHOD)

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Recurring Decimals

EDEXCEL GCSE EXAM PRACTICE

Total: 16 marks

Recurring Decimals — Practice Questions

Check the Calculator or Non-Calculator label on each question before you start. Show your working clearly in the box.

Question 1 ☒ Non-Calculator

(2 marks)

Write $\frac{5}{12}$ as a recurring decimal.

WORKING OUT SPACE

Answer:

Question 2 ☒ Non-Calculator

(2 marks)

Write $\frac{5}{22}$ as a recurring decimal.

WORKING OUT SPACE

Answer:

Question 3 ☒ Non-Calculator

(3 marks)

Write $0.\dot{4}\dot{7}$ (which is $0.4777\dots$) as a fraction in its simplest form.

WORKING OUT SPACE

Answer:

Question 4 **Non-Calculator****(3 marks)**

Prove algebraically that the recurring decimal $0.\dot{1}2\dot{3}$ can be written as the fraction $\frac{41}{333}$.

WORKING & PROOF SPACE

Question 5 **Non-Calculator****(3 marks)**

Work out $0.\dot{3} + 0.\dot{2}7$. Give your answer as a fraction in its simplest form.

WORKING OUT SPACE

Answer:**Question 6** **Non-Calculator****(3 marks)**

Write the recurring decimal $2.1\dot{3}\dot{6}$ (which is $2.1363636 \dots$) as an improper fraction in its simplest form.

WORKING OUT SPACE

Answer:

Negative & Fractional Indices

EDEXCEL GCSE EXAM PRACTICE

Total: 11 marks

Negative & Fractional Indices — Practice Questions

Check the Calculator or Non-Calculator label on each question before you start. Show your working clearly in the box.

Question 1 ☒ Non-Calculator

(1 mark)

Evaluate 2^{-2}

WORKING OUT SPACE

Answer:

Question 2 ☒ Non-Calculator

(2 marks)

Evaluate $64^{-2/3}$

WORKING OUT SPACE

Answer:

Question 3 ☒ Non-Calculator

(2 marks)

Evaluate $\left(\frac{8}{27}\right)^{-2/3}$

WORKING OUT SPACE

Answer:

Question 4 Non-Calculator**(1 mark)**

Given that $\frac{x^8}{x^a} = x^{10}$, find the value of a .

WORKING OUT SPACE

Answer:**Question 5** Non-Calculator**(2 marks)**

Given that $16^3 = 2^x$, find the value of x .

WORKING OUT SPACE

Answer:**Question 6** Non-Calculator**(3 marks)**

Given that $\frac{9^x}{3^{x-1}} = 81$, find the value of x .

WORKING OUT SPACE

Answer:

Expanding Triple Brackets

EDEXCEL GCSE EXAM PRACTICE

Total: 18 marks

Expanding Triple Brackets — Practice Questions

Check the Calculator or Non-Calculator label on each question before you start. Show your working clearly in the box.

Question 1 ☒ Non-Calculator

(3 marks)

Expand and simplify $(x - 1)(x + 2)(x + 5)$

WORKING OUT SPACE

Answer:

Question 2 ☒ Non-Calculator

(3 marks)

Expand and simplify $(x - 4)(x + 3)(x - 6)$

WORKING OUT SPACE

Answer:

Question 3 ☒ Non-Calculator

(3 marks)

Expand and simplify $(x + 2)(x - 4)^2$

WORKING OUT SPACE

Answer:

Question 4 **Non-Calculator****(3 marks)**Expand and simplify $(2x + 3)(3x - 1)(x + 4)$

WORKING OUT SPACE

Answer:

Question 5 **Non-Calculator****(3 marks)**Show that $(3x - 2)(2x + 5)(2x - 1) \equiv 12x^3 + 16x^2 - 31x + 10$ for all values of x .

WORKING & PROOF SPACE

Question 6 **Non-Calculator****(3 marks)**Given that $(2x + 3)(4x - 5)(2 - 3x) \equiv ax^3 + bx^2 + cx - 30$ for all values of x , work out the values of the integers a , b , and c .

WORKING OUT SPACE

 $a = \dots\dots\dots$ $b = \dots\dots\dots$ $c = \dots\dots\dots$

Graphical Inequalities

EDEXCEL GCSE EXAM PRACTICE

Total: 16 marks

Graphical Inequalities — Practice Questions

Check the Calculator or Non-Calculator label on each question before you start. Show your working clearly in the box.

Question 1 ☒ Non-Calculator

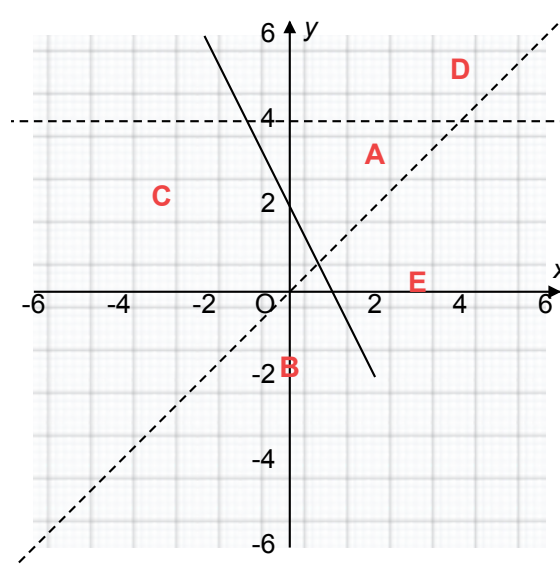
(2 marks)

Which region (A, B, C, D, or E) satisfies all these inequalities?

$$y < 4$$

$$y > x$$

$$y \geq -2x + 2$$

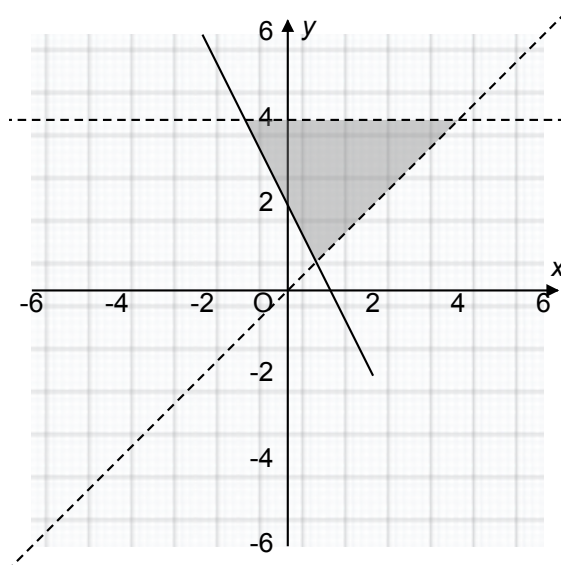


WORKING OUT SPACE

Answer:

Question 2 **Non-Calculator****(2 marks)**

How many integer coordinates lie in the shaded region?

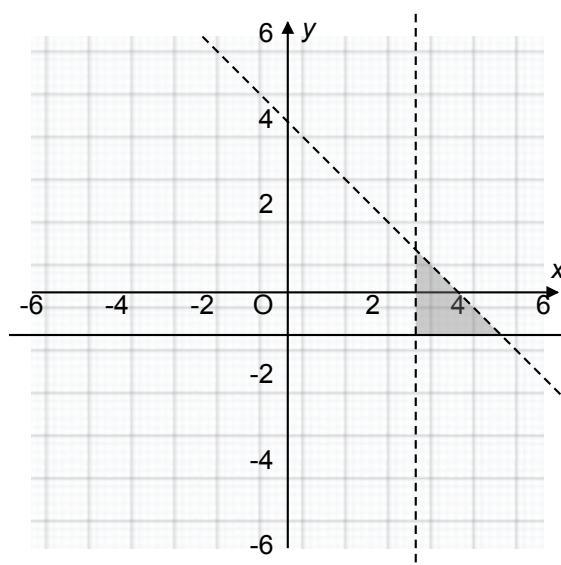


WORKING OUT SPACE

Answer:

Question 3 **Non-Calculator****(3 marks)**

Write down the three inequalities that define the shaded region.



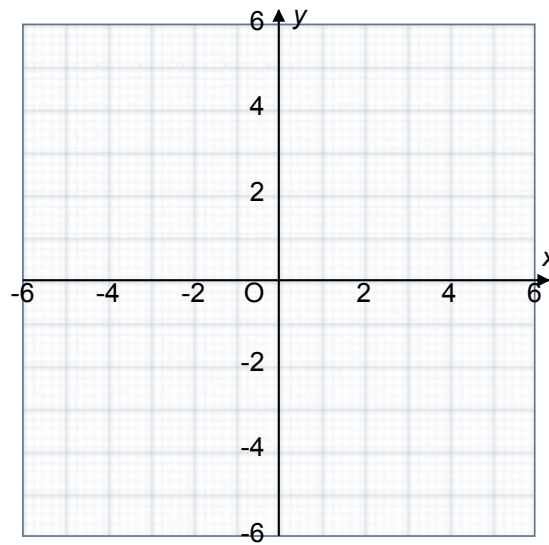
WORKING OUT SPACE

1: 2: 3:

Question 4 **Non-Calculator****(3 marks)**

On the grid below, draw the boundary lines and shade the region R that satisfies all three inequalities:

$$x > 1, \quad y \geq -1, \quad x + y < 4$$



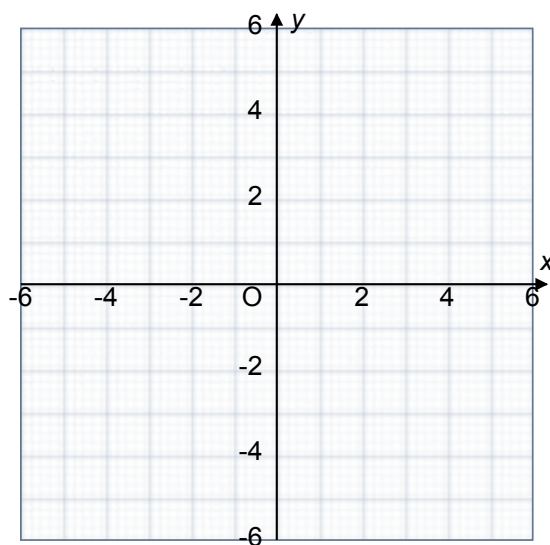
Label your shaded region R .

WORKING OUT SPACE

Question 5 **Non-Calculator****(3 marks)**

On the grid below, draw the boundary lines and shade the region R that satisfies all three inequalities:

$$y \geq -1, \quad y < 2x + 1, \quad x + y < 4$$



Work out how many integer coordinates (x, y) satisfy all three inequalities.

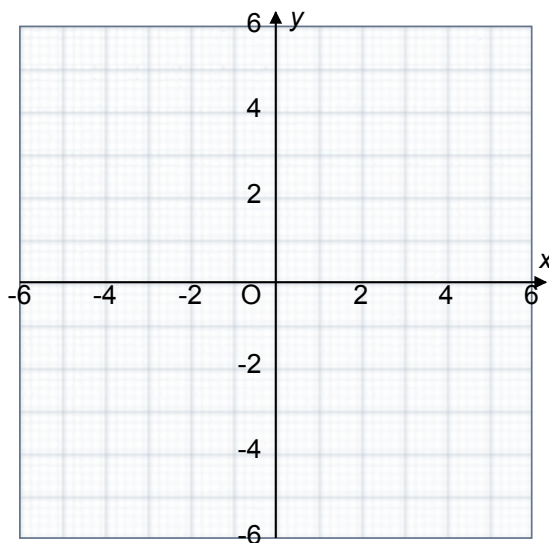
WORKING OUT SPACE

Answer:

Question 6 **Non-Calculator****(3 marks)**

On the grid below, draw the boundary lines and shade the region R that satisfies all three inequalities:

$$y > -4, \quad y \leq 3x - 1, \quad 2x + y < 4$$



Work out how many integer coordinates (x, y) satisfy all three inequalities.

WORKING OUT SPACE

Answer:

Perpendicular Lines

EDEXCEL GCSE EXAM PRACTICE

Total: 17 marks

Perpendicular Lines — Practice Questions

Check the Calculator or Non-Calculator label on each question before you start. Show your working clearly in the box.

Question 1 ☒ Non-Calculator

(2 marks)

A straight line has the equation $y = 3x + 1$.

Write down the equation of a line parallel to this which passes through the point $(0, 3)$.

WORKING OUT SPACE

Answer:

Question 2 ☒ Non-Calculator

(2 marks)

Write down the equation of the line perpendicular to $y = \frac{1}{4}x - 3$ which passes through $(0, -10)$.

WORKING OUT SPACE

Answer:

Question 3 ☒ Non-Calculator

(3 marks)

A straight line has the equation $y = 5x + -4$.

Find the equation of a line parallel to this which passes through the point $(-2, -18)$.

WORKING OUT SPACE

Answer:

Question 4 **Non-Calculator****(3 marks)**

Find the equation of the line perpendicular to $4y = 3x + 2$ which passes through $(0, 6)$.

WORKING OUT SPACE

Answer:**Question 5** **Non-Calculator****(3 marks)**

Line L passes through the point $(3, 4)$ and is perpendicular to the line with equation $x + 3y = 15$.
Find the equation of Line L in the form $y = mx + c$.

WORKING OUT SPACE

Answer:**Question 6** **Non-Calculator****(4 marks)**

Find the equation of the perpendicular bisector of the line segment joining $A(-2, 1)$ and $B(4, 13)$.
Give your answer in the form $y = mx + c$.

WORKING OUT SPACE

Answer:

Circle Theorems

EDEXCEL GCSE EXAM PRACTICE

Total: 17 marks

Circle Theorems — Practice Questions

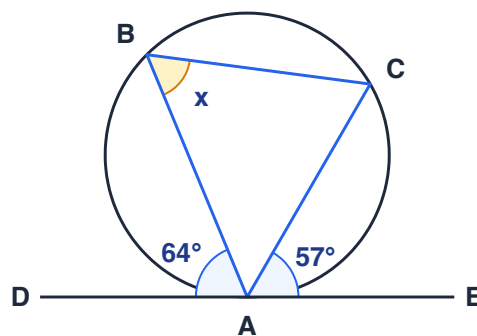
Check the Calculator or Non-Calculator label on each question before you start. Show your working clearly in the box.

Question 1 ✖ Non-Calculator

(2 marks)

DAE is a tangent to the circle at A .

Angle $DAB = 64^\circ$ and angle $CAE = 57^\circ$.



Write down the size of angle ABC (x) and give a geometric reason for your answer.

WORKING OUT SPACE

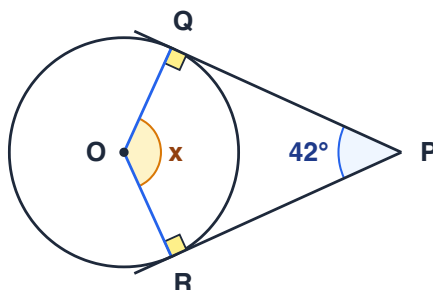
Angle:

Reason(s):

Question 2 **Non-Calculator****(3 marks)**

Q and R are points on a circle with centre O .

PQ and PR are tangents to the circle from P , and angle $QPR = 42^\circ$.



Calculate the size of angle QOR (x). Give reasons for each stage of your working.

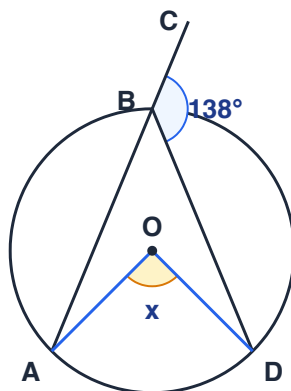
WORKING OUT SPACE

Angle:

Reason(s):

Question 3 **Non-Calculator****(3 marks)**

In the circle with centre O , ABC is a straight line and angle $CBD = 138^\circ$.



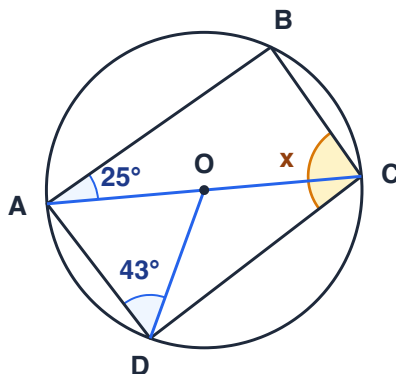
Find the size of angle AOD (x).

WORKING OUT SPACE

Answer:

Question 4 **Non-Calculator****(3 marks)**

In the diagram, O is the centre of the circle and AOC is a diameter. Angle $BAO = 25^\circ$ and angle $ADO = 43^\circ$.



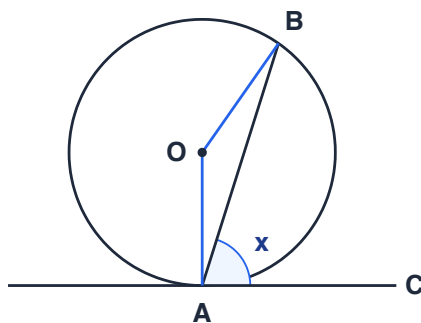
Find the size of angle BCD (x).

WORKING OUT SPACE

Answer:

Question 5 **Non-Calculator****(3 marks)**

A and B are points on the circumference of a circle, centre O , and CA is a tangent to the circle at A . Angle $CAB = x$.

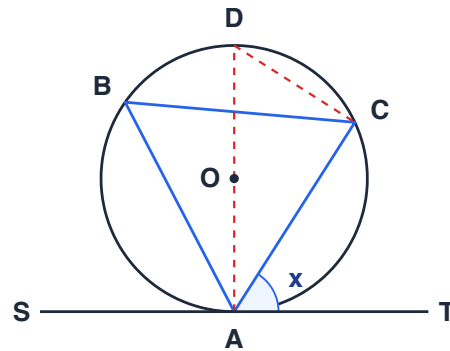


Prove algebraically that angle $AOB = 2x$. Give a geometric reason for each stage of your working.

WORKING & PROOF SPACE

Question 6 **Non-Calculator****(3 marks)**

A , B , and C are points on the circumference of a circle with centre O .
 SAT is a tangent to the circle at A , and AD is a diameter of the circle.



Given that angle $CAT = x$, prove that angle $ABC = x$.

WORKING & PROOF SPACE

Negative Enlargements & Invariant Points

EDEXCEL GCSE EXAM PRACTICE

Total: 14 marks

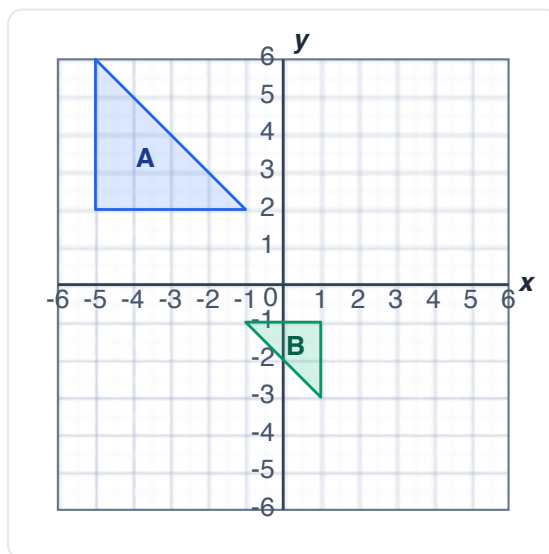
Negative Enlargements & Invariant Points — Practice Questions

Check the Calculator or Non-Calculator label on each question before you start. Show your working clearly in the box.

Question 1 ☒ Non-Calculator

(2 marks)

Shape A is enlarged to give Shape B , as shown on the coordinate grid below.



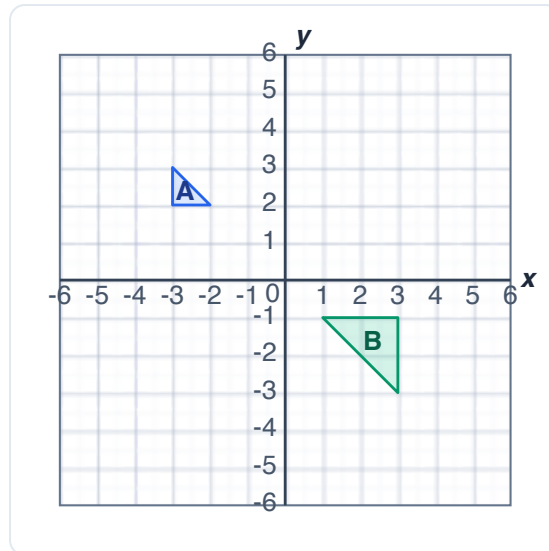
Write down the scale factor of the enlargement that maps Shape A onto Shape B .

WORKING OUT SPACE

Answer:

Question 2 **Non-Calculator****(2 marks)**

Shape A is enlarged by scale factor -2 to give Shape B , as shown on the coordinate grid below.



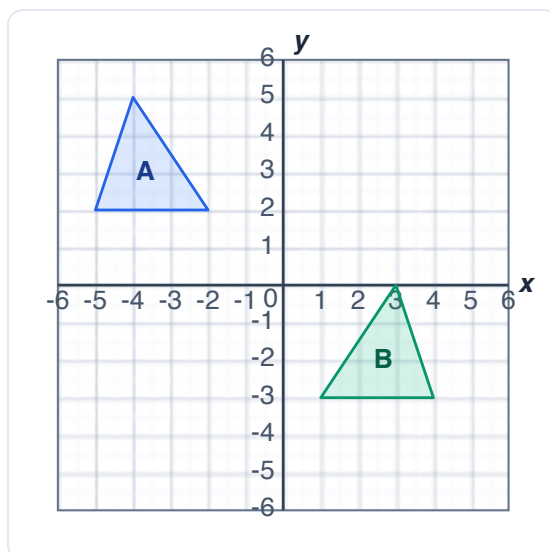
Write down the coordinates of the centre of enlargement.

WORKING OUT SPACE

Answer:

Question 3 **Non-Calculator****(2 marks)**

Shape A and Shape B are drawn on the coordinate grid below.



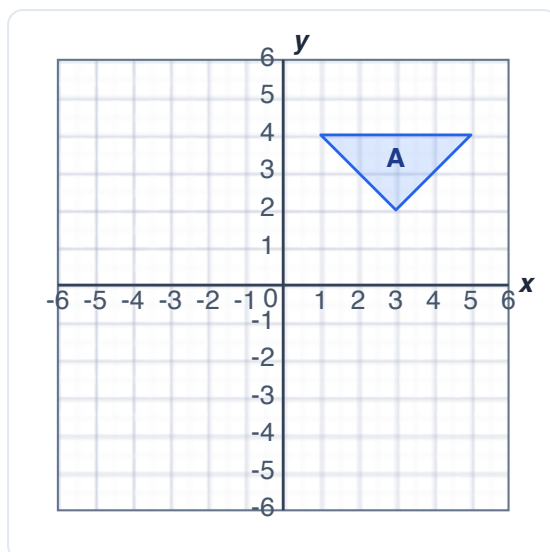
Shape A is reflected in the y -axis ($x = 0$) and then translated by the column vector $\begin{pmatrix} p \\ q \end{pmatrix}$ to give Shape B . Find the values of p and q , giving your answer as an ordered pair (p, q) .

WORKING OUT SPACE

Answer:

Question 4 **Non-Calculator****(2 marks)**

Triangle A is drawn on the coordinate grid below.



Triangle A is reflected in the x -axis and then translated by $\begin{pmatrix} 0 \\ 4 \end{pmatrix}$.

Exactly one vertex of Triangle A is an **invariant point** under this transformation.

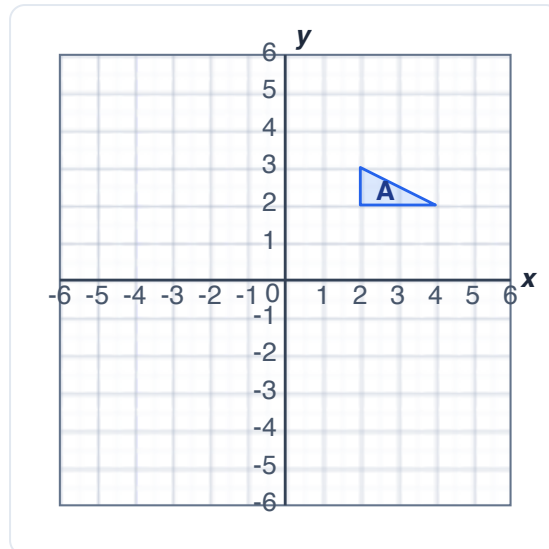
Write down the coordinates of this invariant vertex.

WORKING OUT SPACE

Answer:

Question 5 **Non-Calculator****(3 marks)**

Triangle A is drawn on the coordinate grid below.



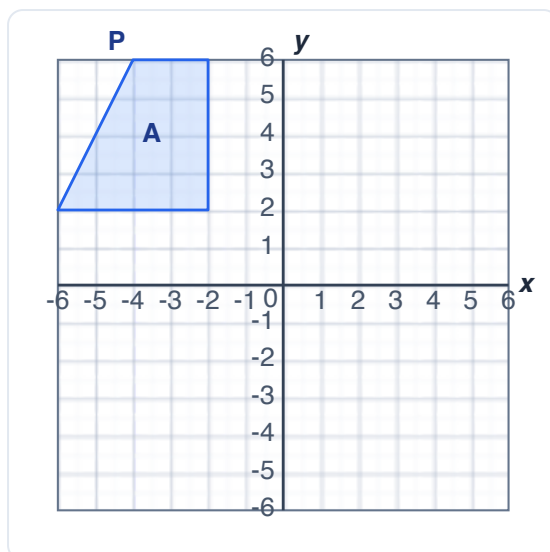
On the grid above, draw the enlargement of Triangle A by scale factor -2 with centre of enlargement at the point $C(1, 1)$.

Label the enlarged triangle B .

WORKING OUT SPACE

Question 6 **Non-Calculator****(3 marks)**

Trapezium A is drawn on the coordinate grid below.



On the grid above, draw the enlargement of Trapezium A by scale factor $-\frac{1}{2}$ with centre of enlargement at the origin $(0, 0)$.

Write down the coordinates of the image of vertex P .

WORKING OUT SPACE

Answer:

Product Rule for Counting

EDEXCEL GCSE EXAM PRACTICE

Total: 16 marks

Product Rule for Counting — Practice Questions

Check the Calculator or Non-Calculator label on each question before you start. Show your working clearly in the box.

Question 1 **Calculator****(2 marks)**

There are 20 cards in a deck.

Lucas is going to give one card to Mateo and one card to Amina.

How many different ways are there of doing this?

WORKING OUT SPACE

Answer:

Question 2 **Calculator****(2 marks)**

There are 52 cards in a deck.

Sienna is going to give one card to Omar, one card to Priya, and one card to Tariq.

How many different ways are there of doing this?

WORKING OUT SPACE

Answer:

Question 3 **Calculator****(3 marks)**

There are 22 students in a class.

Two students are going to be selected to receive a prize.

How many different pairs of students could be selected?

WORKING OUT SPACE

Answer:

Question 4 **Non-Calculator****(3 marks)**

A 4-digit security PIN is made using the digits 1, 2, 3, 4, 5, 6, 7, 8.

No digit can be repeated in the PIN.

The first digit must be an odd number, and the last digit must be an even number.

Work out how many different 4-digit security PINs can be made.

WORKING OUT SPACE

Answer:**Question 5** **Calculator****(3 marks)**

There are 20 teams in a football league.

Each team will play every other team exactly once.

Work out the total number of games played.

WORKING OUT SPACE

Answer:**Question 6** **Non-Calculator****(3 marks)**

In a chess tournament, every player plays one match against each of the other players.

A total of 66 matches are played in the tournament.

Work out the total number of players in the tournament.

WORKING OUT SPACE

Answer:

Cumulative Frequency

EDEXCEL GCSE EXAM PRACTICE

Total: 16 marks

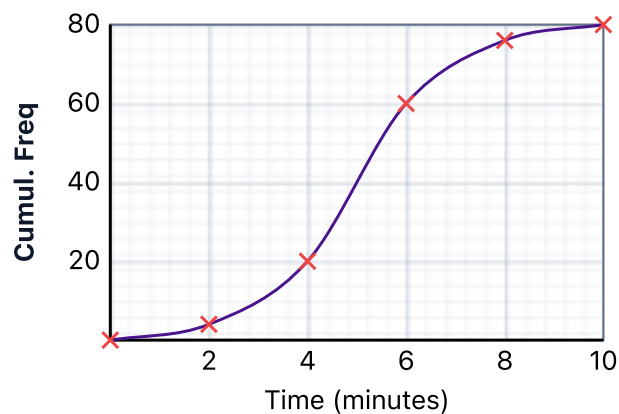
Cumulative Frequency — Practice Questions

Check the Calculator or Non-Calculator label on each question before you start. Show your working clearly in the box.

Question 1 ☒ Non-Calculator

(2 marks)

The cumulative frequency graph shows the time (minutes) taken by 80 people to complete a puzzle.



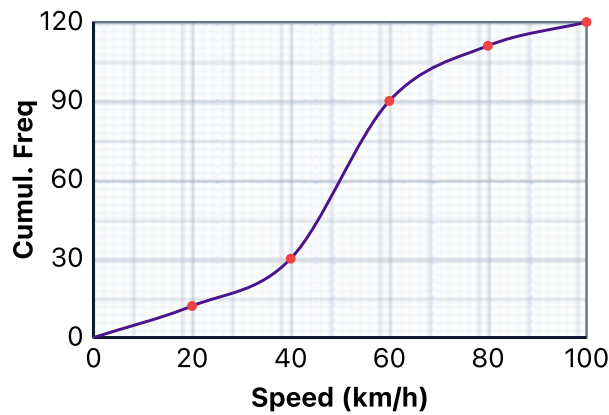
Work out an estimate for the **Median** time.

WORKING OUT SPACE

Answer:

Question 2 ✎ Non-Calculator**(2 marks)**

The cumulative frequency graph shows information about the speeds (in km/h) of 120 cars passing a speed sensor.



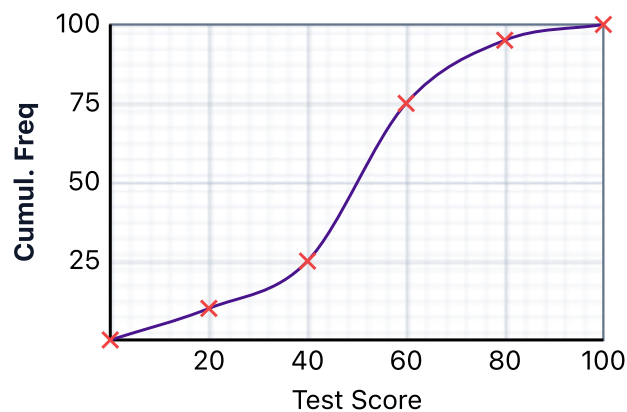
Use the graph to work out an estimate for the **Interquartile Range (IQR)** of the speeds.

WORKING OUT SPACE

Answer:

Question 3 ✎ Non-Calculator**(3 marks)**

The cumulative frequency graph shows the test scores of 100 students.



Students who scored **more than 60** receive a Merit.

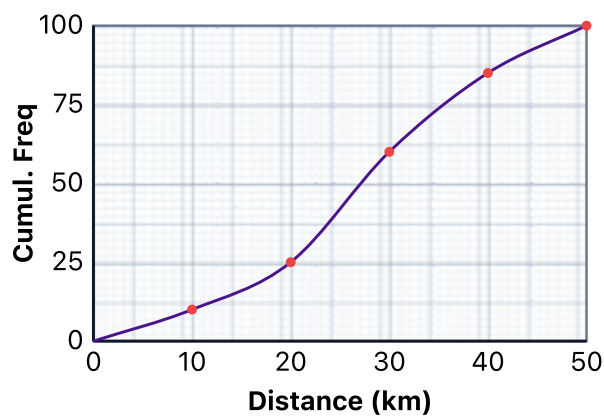
How many students received a Merit?

WORKING OUT SPACE

Answer:

Question 4 **Non-Calculator****(3 marks)**

The cumulative frequency graph shows information about the distances (in km) cycled by 100 charity riders.



Use the graph to find an estimate for the number of riders who cycled **between 20 km and 40 km**.

WORKING OUT SPACE

Answer:

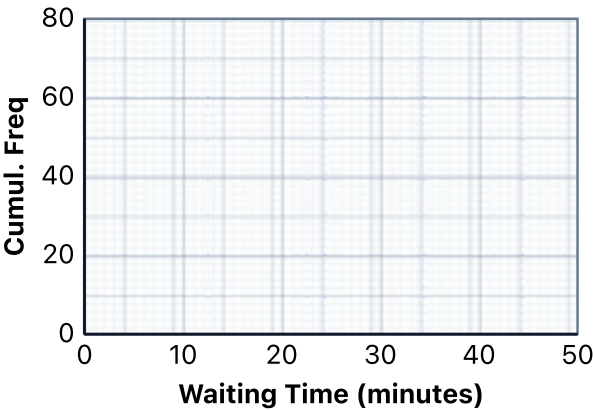
Question 5

Calculator

(3 marks)

The grouped frequency table gives information about the waiting times (in minutes) of 80 patients at a clinic.

Waiting Time (t minutes)	Frequency	Cumulative Frequency
$0 < t \leq 10$	8	
$10 < t \leq 20$	12	
$20 < t \leq 30$	20	
$30 < t \leq 40$	24	
$40 < t \leq 50$	16	



- (i) Complete the cumulative frequency table.
- (ii) On the grid, plot the cumulative frequency graph.
- (iii) Use your graph to find an estimate for the **median** waiting time.

WORKING OUT SPACE

Answer:

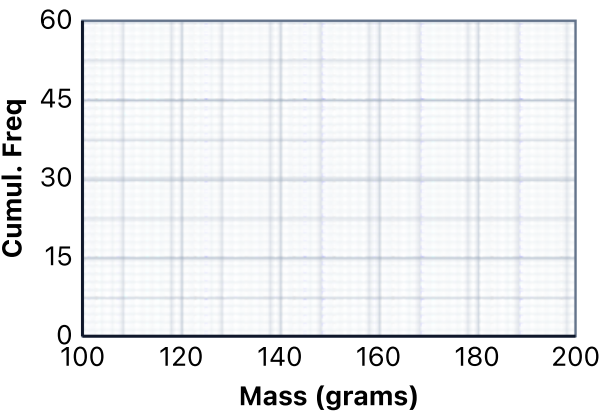
Question 6

Calculator

(3 marks)

The grouped frequency table gives information about the masses (in grams) of 60 apples.

Mass (m grams)	Frequency	Cumulative Frequency
$100 < m \leq 120$	6	
$120 < m \leq 140$	9	
$140 < m \leq 160$	18	
$160 < m \leq 180$	12	
$180 < m \leq 200$	15	



- (i) Complete the cumulative frequency table.
- (ii) On the grid, plot the cumulative frequency graph.
- (iii) Use your graph to work out an estimate for the **Interquartile Range (IQR)**.

WORKING OUT SPACE

Answer:

Box Plots

EDEXCEL GCSE EXAM PRACTICE

Total: 16 marks

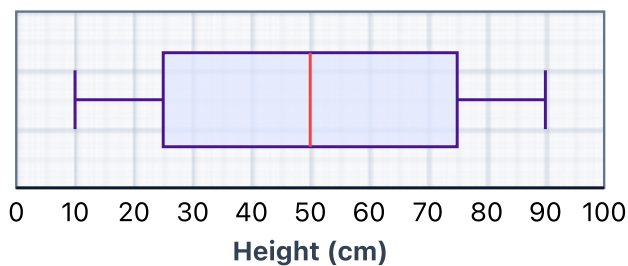
Box Plots — Practice Questions

Check the Calculator or Non-Calculator label on each question before you start. Show your working clearly in the box.

Question 1 ☒ Non-Calculator

(2 marks)

The box plot shows the heights (cm) of some plants.



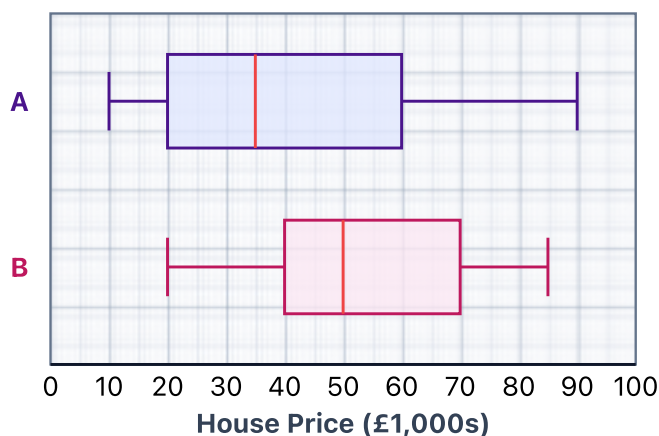
What is the **Interquartile Range (IQR)** of the heights?

WORKING OUT SPACE

Answer:

Question 2 ✎ Non-Calculator**(2 marks)**

The box plots show the distribution of house prices (£1,000s) in Town A and Town B.



Compare the distributions of house prices in Town A and Town B.

WORKING OUT SPACE

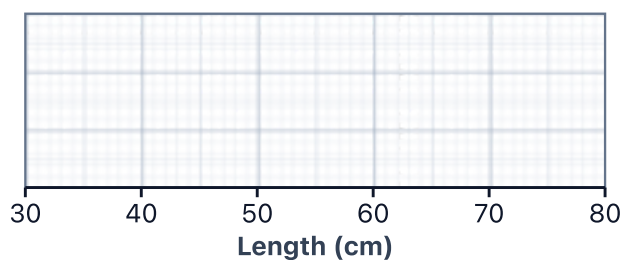
1 (Average):

2 (Spread):

Question 3 ✎ Non-Calculator**(3 marks)**

The lengths (in cm) of 11 wooden planks are recorded below.

47, 50, 56, 39, 37, 54, 71, 52, 37, 39, 62



On the grid above, draw a box plot for this information, and work out the **Interquartile Range (IQR)**.

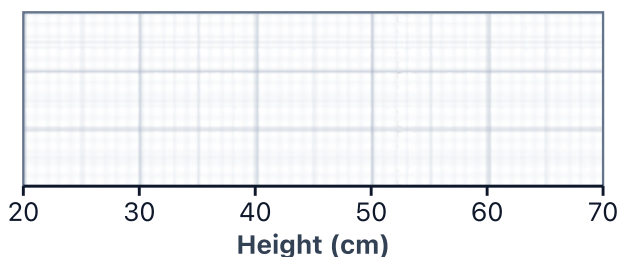
WORKING OUT SPACE

Answer:

Question 4 **Non-Calculator****(3 marks)**

The heights (in cm) of 15 saplings in a nursery are recorded below.

55, 48, 47, 50, 53, 33, 50, 34, 32, 47, 41, 65, 28, 59, 29



On the grid above, draw a box plot for this information, and work out the **Interquartile Range (IQR)**.

WORKING OUT SPACE

Answer:

Question 5 **Non-Calculator****(3 marks)**

The table shows information about the weights, in grams, of 60 pears in a crate.

Min	Lower Quartile	Median	IQR	Range
110 g	126 g	142 g	28 g	65 g

(a) Work out the Upper Quartile (UQ) and the Maximum weight of the pears.

(b) Work out an estimate for the number of pears in the crate that weigh more than 126 g.

WORKING OUT SPACE

(a) UQ = g, Max = g (b) pears

Question 6 **Non-Calculator****(3 marks)**

The table shows information about the test scores of students in Class A and Class B.

Group	Min	LQ	Median	UQ	Max
Class A	24	38	48	51	70
Class B	30	55	63	74	88

Compare the distributions of test scores in Class A and Class B. You must make two comparisons in context.

WORKING OUT SPACE

1 (Average):

2 (Spread):

Stratified Sampling

EDEXCEL GCSE EXAM PRACTICE

Total: 13 marks

Stratified Sampling — Practice Questions

Check the Calculator or Non-Calculator label on each question before you start. Show your working clearly in the box.

Question 1

Calculator

(2 marks)

The table shows the number of students in each year group at Brookfield High School.

Year	Year 7	Year 8	Year 9	Year 10	Year 11	Total
Students	210	195	180	165	150	900

Mrs Patel takes a stratified sample of 60 students.
Work out the number of **Year 8** students in her sample.

WORKING OUT SPACE

Answer:

Question 2

Calculator

(2 marks)

The table shows the number of workers at four branches of a supermarket chain.

Branch	Ashford	Brampton	Clevedon	Drayton
Workers	136	214	185	115

A stratified sample of 80 workers is chosen.
Work out the number of workers from **Brampton** in the sample. Give your answer to the nearest whole number.

WORKING OUT SPACE

Answer:

Question 3 **Calculator****(2 marks)**

The table shows the number of students in four year groups at a college.

Year Group	Year 10	Year 11	Year 12	Year 13
Students	250	225	175	150

In a stratified sample, 30 students are chosen from Year 10.

Work out the number of **Year 12** students in the sample.

WORKING OUT SPACE

Answer:

Question 4 **Calculator****(2 marks)**

The table shows the number of staff at three hospitals in a health trust.

Hospital	St Jude's	Parkview	Glenfield
Staff	420	315	525

A stratified sample is taken by hospital. There are 18 staff from Parkview in the sample.

Work out the **total number of staff** in the entire stratified sample.

WORKING OUT SPACE

Answer:

Question 5 **Non-Calculator****(2 marks)**

In an athletics club, the numbers of Sprinters, Hurdlers, and Throwers are in the ratio 6 : 5 : 4.

Event Group	Sprinters	Hurdlers	Throwers
Ratio Share	6	5	4

A stratified sample of 75 athletes is chosen.

Work out the number of **Hurdlers** in the sample.

WORKING OUT SPACE

Answer:

Question 6**Calculator****(3 marks)**

A bag contains 240 counters of three colours, as shown in the table.

Colour	Red	Blue	Green	Total
Counters	60	96	84	240

A stratified sample of 20 counters is taken. Two counters are then picked at random from the sample of 20 without replacement.

Work out the probability that **both** counters picked from the sample are **Blue**. Give your answer as a simplified fraction.

WORKING OUT SPACE

Answer:

Capture-Recapture

EDEXCEL GCSE EXAM PRACTICE

Total: 13 marks

Capture-Recapture — Practice Questions

Check the Calculator or Non-Calculator label on each question before you start. Show your working clearly in the box.

Question 1 **Calculator****(2 marks)**

A scientist wants to find an estimate for the number of beads in a bag.

She takes a sample of **24** beads, marks each bead with a black cross, and puts them back.

A week later, she takes a second sample of **18** beads.

She finds that **3** of these have been marked.

Work out an estimate for the total number of beads in a bag.

WORKING OUT SPACE

Answer:

Question 2 **Calculator****(2 marks)**

A scientist wants to find an estimate for the number of ants in a colony.

She takes a sample of **34** ants, marks each one with a dye, and releases them back.

A week later, she takes a second sample of **72** ants.

She finds that **8** of these have been marked.

Work out an estimate for the total number of ants in a colony.

WORKING OUT SPACE

Answer:

Question 3 **Calculator****(2 marks)**

A ranger wants to find an estimate for the number of deer in a forest.
She catches a sample of **83** deer, tags their ears, and releases them back into the forest.
A week later, she catches a second sample of **100** deer and finds that **5** of them are tagged.
Work out an estimate for the total number of deer in the forest.

WORKING OUT SPACE

Answer:**Question 4** **Calculator****(2 marks)**

A biologist catches a sample of M fish from a lake, tags each fish, and releases them back into the lake.
A week later, she catches a second sample of **120** fish and finds that **8** of them are tagged.
Using these results, she estimates that there are **900** fish in the lake in total.
Work out the value of M .

WORKING OUT SPACE

Answer:**Question 5** **Non-Calculator****(3 marks)**

A scientist catches a sample of **30** birds in a sanctuary, places a ring on each bird's leg, and releases them.
A week later, the scientist catches a second sample of **130** birds and finds that **13** of them have a ring.
(a) Work out an estimate for the total number of birds in the sanctuary.
(b) If some of the rings fell off between the two samples, explain how this would affect the scientist's estimate in part (a).

WORKING OUT SPACE

(a) Estimate:**(b)**

Question 6 **Non-Calculator****(2 marks)**

State two mathematical assumptions that a biologist must make when using the capture-recapture method to estimate the size of a wildlife population.

WORKING OUT SPACE

Assumption 1:

Assumption 2:

Mixed Review 1 — Choosing the Right Method (Non-Calculator)**Total: 42 marks**

These 15 unseen Grade 6 questions are mixed across topics with no topic headings — just like a real Edexcel Paper 1 exam. Identify the underlying method first, set out full working, and give exact simplified answers.

Question 1 **Non-Calculator****(2 marks)**

Evaluate:

$$\left(\frac{27}{8}\right)^{-2/3}$$

WORKING OUT SPACE

Answer:**Question 2** **Non-Calculator****(3 marks)**

Prove algebraically that the recurring decimal $0.2\dot{5}\dot{4}$ (which is $0.2545454\dots$) can be written as the fraction $\frac{14}{55}$.

WORKING & PROOF SPACE

Question 3 **Non-Calculator****(3 marks)**

Expand and simplify:

$$(2x - 1)(x + 3)(x - 4)$$

WORKING OUT SPACE

Answer:

Question 4 ✎ Non-Calculator**(3 marks)**

Line L passes through the point $(6, -1)$ and is perpendicular to the line with equation $y = \frac{3}{2}x + 4$.
Find the equation of Line L in the form $y = mx + c$.

WORKING OUT SPACE

Answer:

Question 5 ✎ Non-Calculator**(2 marks)**

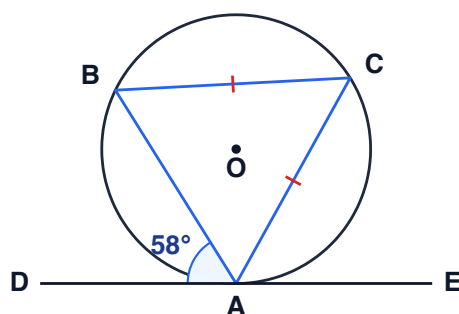
Given that $8^4 = 2^x$, find the value of x .

WORKING OUT SPACE

Answer:

Question 6 ✎ Non-Calculator**(3 marks)**

A , B , and C are points on the circumference of a circle with centre O .
 DAE is a tangent to the circle at A .
Angle $DAB = 58^\circ$ and $AC = BC$.



Work out the size of angle CAB . Give a reason for each stage of your working.

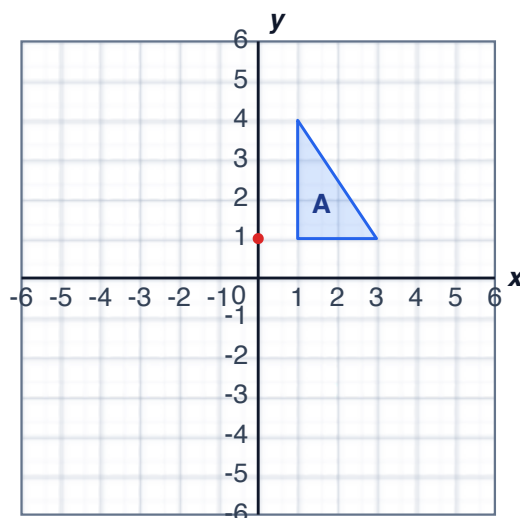
WORKING OUT SPACE

Angle:

Reason(s):

Question 7 **Non-Calculator****(3 marks)**

Triangle A has vertices at $(1, 1)$, $(3, 1)$, and $(1, 4)$.



On the grid, draw the enlargement of Triangle A by scale factor -2 with centre of enlargement at $(0, 1)$.
Write down the coordinates of the vertices of the enlarged triangle.

WORKING OUT SPACE

Vertices: (__ , __) (__ , __) (__ , __)

Question 8 **Non-Calculator****(3 marks)**

A 3-digit lock code is formed using the digits 1, 2, 3, 4, 5, 6, 7.

No digit can be repeated.

The first digit must be greater than 4.

Work out how many different 3-digit lock codes can be formed.

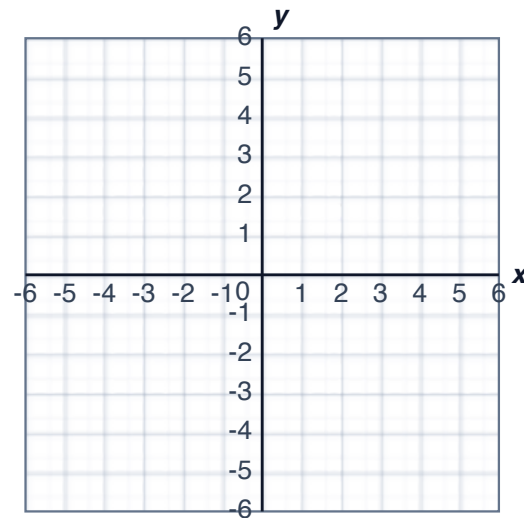
WORKING OUT SPACE

Answer:

Question 9 Non-Calculator**(3 marks)**

On the grid, draw the boundary lines and shade the region R that satisfies all three inequalities:

$$x \geq -2, \quad y > x - 1, \quad x + y \leq 3$$



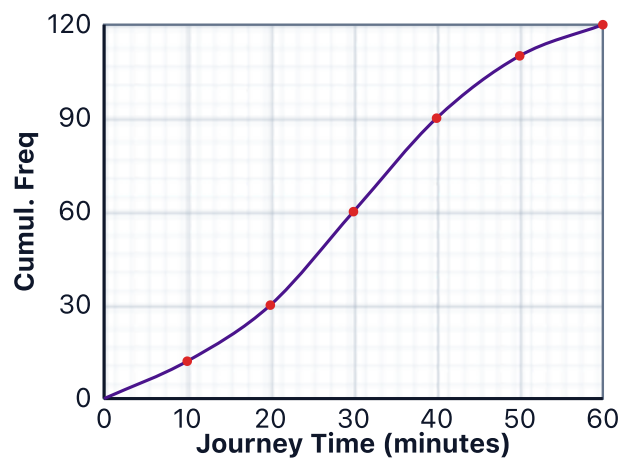
Work out how many integer coordinates (x, y) satisfy all three inequalities.

WORKING OUT SPACE

Answer:

Question 10 Non-Calculator**(3 marks)**

The cumulative frequency graph shows the journey times, in minutes, of 120 commuters.



- (a) Use the graph to find an estimate for the interquartile range (IQR) of the journey times.
 (b) Estimate how many commuters had a journey time of more than 40 minutes.

WORKING OUT SPACE

(a) IQR = min (b) commuters

Question 11 ✎ Non-Calculator**(3 marks)**

In a college, the numbers of students studying Art, Drama, and Music are in the ratio 4 : 5 : 3.
 A stratified sample of 60 students is selected by subject.
 Work out how many Drama students are in the sample.

WORKING OUT SPACE

Answer:

Question 12 ✎ Non-Calculator**(2 marks)**

Triangle P has vertices at $(1, 2)$, $(3, 5)$, and $(4, 2)$.

Triangle P is reflected in the line $y = x$ and then translated by $\begin{pmatrix} -2 \\ 2 \end{pmatrix}$.

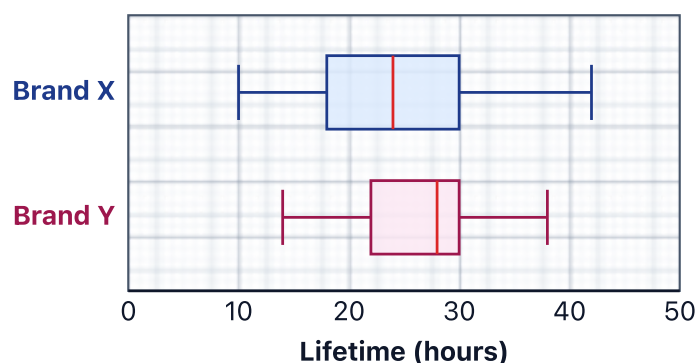
Exactly one vertex of Triangle P is invariant under this combined transformation.
 Write down the coordinates of this invariant vertex.

WORKING OUT SPACE

Answer:

Question 13 ✎ Non-Calculator**(3 marks)**

The box plots show the lifetimes, in hours, of a sample of Brand X batteries and a sample of Brand Y batteries.



Compare the distributions of the lifetimes of Brand X and Brand Y batteries. Make two comparisons in context.

WORKING OUT SPACE

1 (Average):

2 (Spread):

Question 14 ✎ Non-Calculator**(3 marks)**

An ecologist catches 40 lizards on an island, marks them with harmless dye, and releases them. The next day, she catches 60 lizards and finds that 8 of them are marked.

- (a) Work out an estimate for the total number of lizards on the island.
 (b) State one assumption the ecologist has made in working out this estimate.

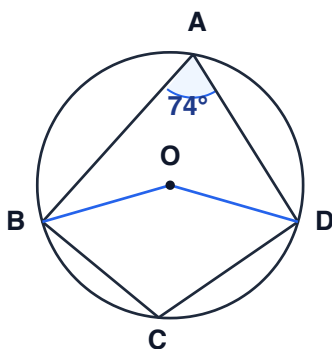
WORKING OUT SPACE

(a) Estimate:

(b)

Question 15 ✎ Non-Calculator**(3 marks)**

A , B , C , and D are points on the circumference of a circle with centre O .
 Angle $BAD = 74^\circ$.



Work out the size of angle BOD and the size of angle BCD . Give a reason for each answer.

WORKING OUT SPACE

 $\angle BOD =$ Reason: $\angle BCD =$ Reason:

EDEXCEL GCSE HIGHER PAPER 2/3 — CALCULATOR (GRADE 6)

Mixed Review 2 of 2

Mixed Review 2 — Choosing the Right Method (Calculator)

Total: 45 marks

These 15 unseen Grade 6 questions are interleaved across topics to test method selection under Paper 2/3 conditions. Show every step of your working clearly.

Question 1 Calculator

(2 marks)

The table shows the number of employees in four branches of a bank:

London	Manchester	Birmingham	Leeds
420	280	190	110

A stratified sample of 80 employees is taken.

Work out the number of employees from the Manchester branch in the sample.

WORKING OUT SPACE

Answer:

Question 2 Calculator

(3 marks)

Expand and simplify:

$$(3x + 2)(2x - 5)(x + 4)$$

WORKING OUT SPACE

Answer:

Question 3 Calculator

(2 marks)

A wildlife ranger catches 65 voles in a woodland, tags them, and releases them.

A week later, he catches 84 voles and finds that 13 of them are tagged.

Work out an estimate for the total number of voles in the woodland.

WORKING OUT SPACE

Answer:

Question 4 **Calculator****(3 marks)**

Work out:

$$0.\dot{4} + 0.1\dot{6}$$

Give your answer as a fraction in its simplest form.

WORKING OUT SPACE

Answer:**Question 5** **Calculator****(2 marks)**

There are 16 teams in a basketball tournament.

Every team plays one match against each of the other teams in the first round.

Work out the total number of matches played in the first round.

WORKING OUT SPACE

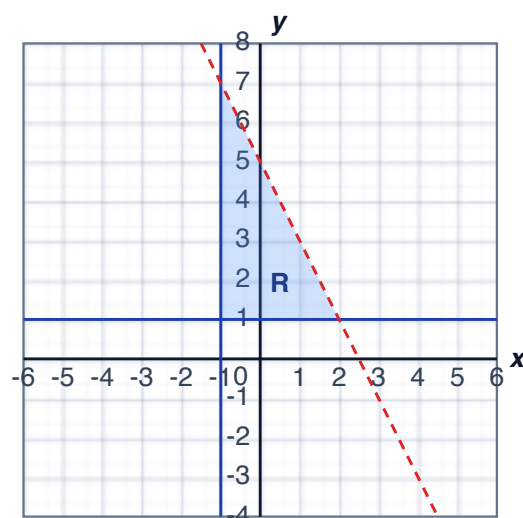
Answer:**Question 6** **Calculator****(4 marks)**Find the equation of the perpendicular bisector of the line segment joining $A(2, -3)$ and $B(8, 9)$.Give your answer in the form $y = mx + c$.

WORKING OUT SPACE

Answer:

Question 7 **Calculator****(3 marks)**

Write down the three inequalities that define the shaded region R shown on the grid.



WORKING OUT SPACE

1: 2: 3:

Question 8 **Calculator****(3 marks)**

The table shows the number of students in three year groups at a sixth form college:

Year 12	Year 13	Foundation
360	280	160

In a stratified sample by year group, 18 students are selected from Year 12.

Work out the total number of students in the entire stratified sample.

WORKING OUT SPACE

Answer:

Question 9 **Calculator****(3 marks)**

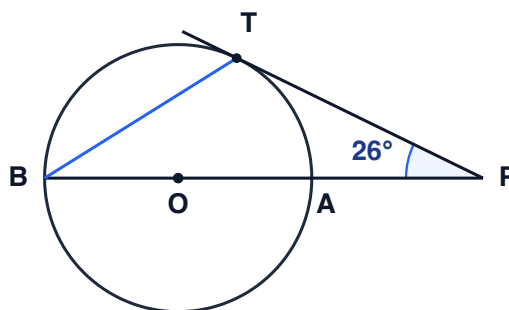
Given that $\frac{4^{x+1}}{2^{x-2}} = 64$, find the value of x .

WORKING OUT SPACE

Answer:

Question 10 **Calculator****(3 marks)**

A , B , and T are points on the circumference of a circle with centre O .
 BAO is a straight line extended to P , and PT is a tangent to the circle at T .
 Angle $APT = 26^\circ$.



Work out the size of angle ABT . Give reasons for your working.

WORKING OUT SPACE

Angle:

Reason(s):

Question 11 **Calculator****(3 marks)**

The heights, in cm, of 11 tomato plants are:

24, 31, 19, 42, 28, 35, 22, 38, 29, 45, 26

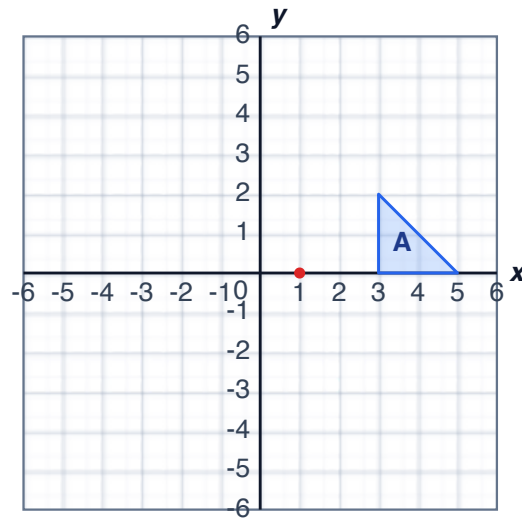
Work out the median, lower quartile (LQ), upper quartile (UQ), and interquartile range (IQR) of the heights.

WORKING OUT SPACE

Med: LQ: UQ: IQR:

Question 12 **Calculator****(3 marks)**

Shape A has vertices at $(3, 0)$, $(5, 0)$, and $(3, 2)$.



Shape A is enlarged by scale factor $-\frac{3}{2}$ with centre of enlargement at $(1, 0)$ to give Shape B .

On the grid, draw Shape B and write down the coordinates of its three vertices.

WORKING OUT SPACE

Vertices: (__ , __) (__ , __) (__ , __)

Question 13 **Calculator****(4 marks)**

A crate contains 180 apples of three varieties:

Gala	Braeburn	Fuji
54	72	54

A stratified sample of 15 apples is selected by variety.

Two apples are then chosen at random from the sample of 15 without replacement.

Work out the probability that both apples chosen from the sample are Braeburn. Give your answer as a simplified fraction.

WORKING OUT SPACE

Answer:

Question 14 **Calculator****(3 marks)**

A restaurant menu has 8 starters, x main courses, and 5 desserts.

A meal deal consists of either:

- a starter and a main course, **OR**
- a main course and a dessert.

There are 156 different possible meal deals. Work out the value of x .

WORKING OUT SPACE

Answer:**Question 15** **Calculator****(4 marks)**

The grouped frequency table gives information about the speeds, s mph, of 80 cars:

Speed (s mph)	$20 < s \leq 30$	$30 < s \leq 40$	$40 < s \leq 50$	$50 < s \leq 60$	$60 < s \leq 70$
Frequency	10	18	28	16	8

(a) Write down the coordinates of the five points that should be plotted on a cumulative frequency graph for this data.

(b) Using your cumulative frequencies, state which class interval contains the upper quartile (UQ).

WORKING OUT SPACE

(a) Points:**(b) Class interval:**

APPENDIX

Answers & Mark Schemes

Complete Edexcel Higher answers, completed solution diagrams, and Mixed Review topic guides.

Topic 1: Recurring Decimals

Q1 (Non-Calc): $0.41\dot{6}$ [2m]

Q2 (Non-Calc): $0.2\dot{2}\dot{7}$ [2m]

Q3 (Non-Calc): $\frac{43}{90}$ [3m]

Q4 (Non-Calc): **Proof:** $999x = 123$, so $x = \frac{123}{999} = \frac{41}{333}$ [3m]

Q5 (Non-Calc): $\frac{20}{33}$ [3m]

Q6 (Non-Calc): $\frac{47}{22}$ [3m]

Topic 2: Negative & Fractional Indices

Q1 (Non-Calc): $\frac{1}{4}$ [1m]

Q2 (Non-Calc): $\frac{1}{16}$ [2m]

Q3 (Non-Calc): $\frac{9}{4}$ (or $2\frac{1}{4}$) [2m]

Q4 (Non-Calc): $a = -2$ [1m]

Q5 (Non-Calc): $x = 12$ [2m]

Q6 (Non-Calc): $x = 3$ [3m]

Topic 3: Expanding Triple Brackets

Q1 (Non-Calc): $x^3 + 6x^2 + 3x - 10$ [3m]

Q2 (Non-Calc): $x^3 - 7x^2 - 6x + 72$ [3m]

Q3 (Non-Calc): $x^3 - 6x^2 + 32$ [3m]

Q4 (Non-Calc): $6x^3 + 31x^2 + 25x - 12$ [3m]

Q5 (Non-Calc): **Shown:** $(6x^2 + 11x - 10)(2x - 1)$ expands to $12x^3 + 16x^2 - 31x + 10$ [3m]

Q6 (Non-Calc): $a = -24, b = 10, c = 49$ [3m]

Topic 4: Graphical Inequalities

Q1 (Non-Calc): **A** [2m]

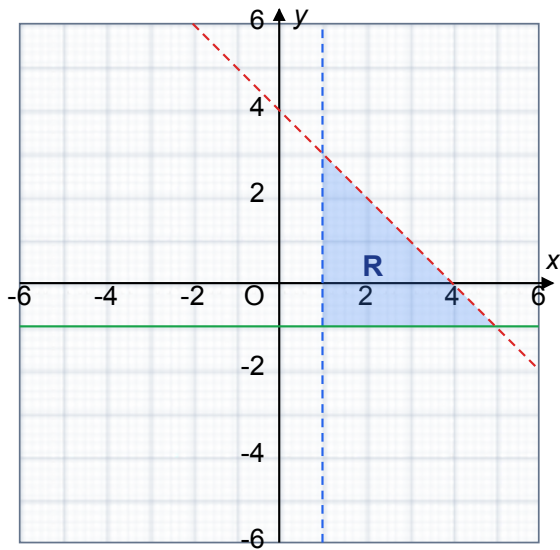
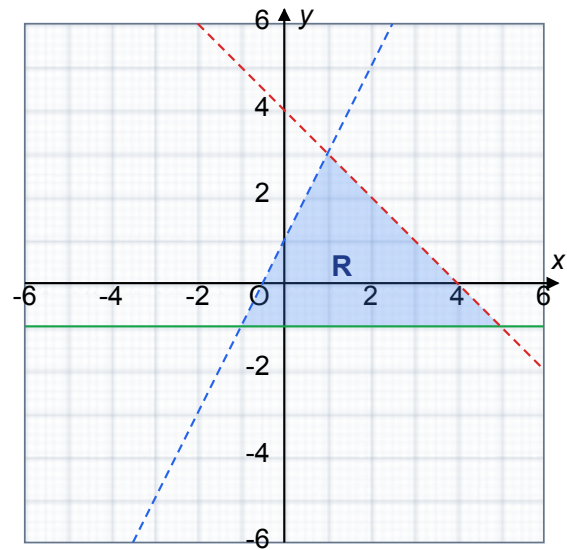
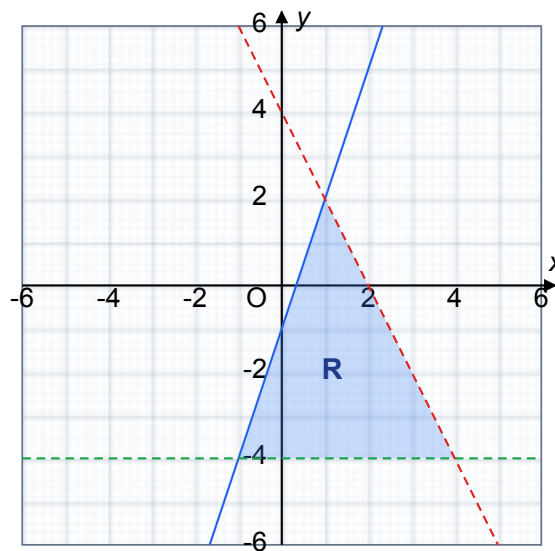
Q2 (Non-Calc): **5** [2m]

Q3 (Non-Calc): $x > 3, y \geq -1, y < -x + 4$ [3m]

Q4 (Non-Calc): **Region R shaded ($y = -1$ solid; $x = 1, x + y = 4$ dashed — see diagram below)** [3m]

Q5 (Non-Calc): **12 integer points (see shaded diagram below)** [3m]

Q6 (Non-Calc): **12 integer points (see shaded diagram below)** [3m]

Q4 — Completed Shaded Region**Q5 — Completed Shaded Region****Q6 — Completed Shaded Region**

Topic 5: Perpendicular Lines

Q1 (Non-Calc): $y = 3x + 3$ [2m]

Q2 (Non-Calc): $y = -4x - 10$ [2m]

Q3 (Non-Calc): $y = 5x - 8$ [3m]

Q4 (Non-Calc): $y = -\frac{4}{3}x + 6$ [3m]

Q5 (Non-Calc): $y = 3x - 5$ [3m]

Q6 (Non-Calc): $y = -\frac{1}{2}x + \frac{15}{2}$ (or $y = -0.5x + 7.5$) [4m]

Topic 6: Circle Theorems

Q1 (Non-Calc): 57° (Alternate segment theorem) [2m]

Q2 (Non-Calc): 138° ($\angle OQP = \angle ORP = 90^\circ$ tangent $\perp$ radius; quad sum 360°) [3m]

Q3 (Non-Calc): 84° ($\angle ABD = 42^\circ$ straight line; $\angle AOD = 2 \times 42^\circ$ at centre) [3m]

Q4 (Non-Calc): 112° (isosceles $\triangle OAB$, $\triangle OAD$ give $\angle BAD = 68^\circ$; cyclic quad $180^\circ - 68^\circ$) [3m]

Q5 (Non-Calc): **Proof:** $\angle OAC = 90^\circ$, $\angle OAB = 90^\circ - x$; $OA = OB$ so $\angle OBA = 90^\circ - x$, hence $\angle AOB = 2x$ [3m]

Q6 (Non-Calc): **Proof:** $\angle DAT = 90^\circ$, $\angle DAC = 90^\circ - x$; $\angle ACD = 90^\circ$ (semicircle), so $\angle ADC = x = \angle ABC$ [3m]

Topic 7: Negative Enlargements & Invariant Points

Q1 (Non-Calc):

$$-\frac{1}{2} \text{ (or } -0.5) \quad [2\text{m}]$$

Q2 (Non-Calc):

$$(-1, 1) \quad [2\text{m}]$$

Q3 (Non-Calc):

$$(-1, -5) \quad [2\text{m}]$$

Q4 (Non-Calc):

$$(3, 2) \quad [2\text{m}]$$

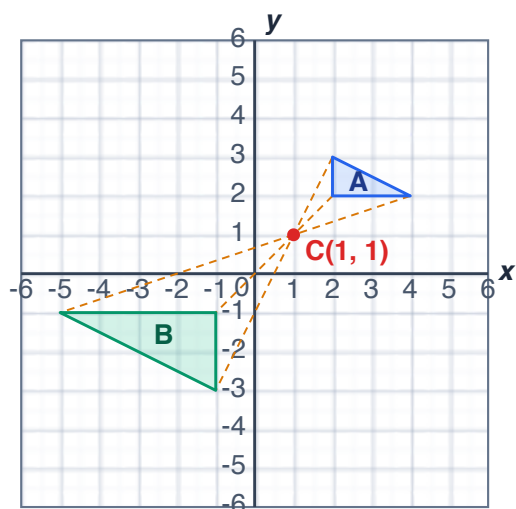
Q5 (Non-Calc):

Vertices $(-1, -1), (-5, -1), (-1, -3)$ — see diagram below [3m]

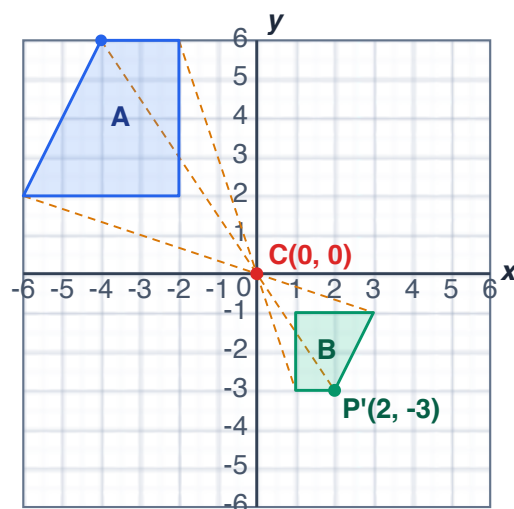
Q6 (Non-Calc):

$$P' = (2, -3) \text{ — see diagram below} \quad [3\text{m}]$$

Q5 — Completed Enlargement Diagram



Q6 — Completed Enlargement Diagram



Topic 8: Product Rule for Counting

Q1 (Calc):

$$380 \quad [2\text{m}]$$

Q2 (Calc):

$$132600 \quad [2\text{m}]$$

Q3 (Calc):

$$231 \quad [3\text{m}]$$

Q4 (Non-Calc):

$$480 \quad [3\text{m}]$$

Q5 (Calc):

$$190 \quad [3\text{m}]$$

Q6 (Non-Calc):

$$12 \quad [3\text{m}]$$

Topic 9: Cumulative Frequency

Q1 (Non-Calc):

5 [2m]

Q2 (Non-Calc):

20 [2m]

Q3 (Non-Calc):

25 [3m]

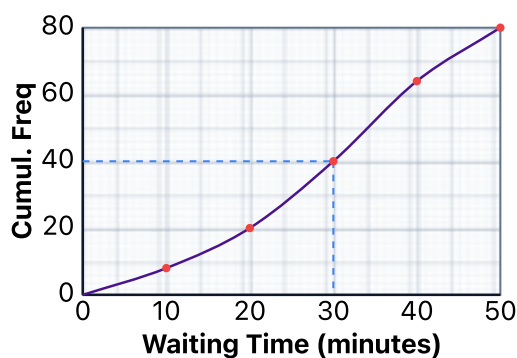
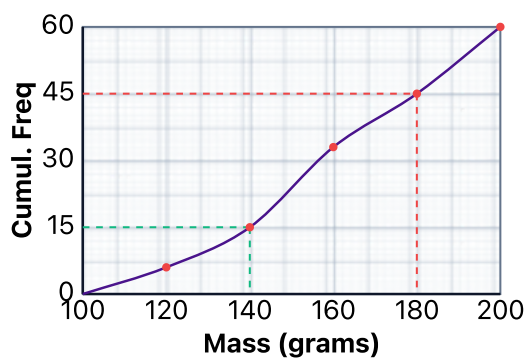
Q4 (Non-Calc):

60 [3m]

Q5 (Calc):

(i) CF: 8, 20, 40, 64, 80 | (ii) See graph below | (iii) Median = 30 [3m]

Q6 (Calc):

(i) CF: 6, 15, 33, 45, 60 | (ii) See graph below | (iii) IQR = 40 (180 – 140) [3m]**Q5 — Completed Cumulative Frequency Graph****Q6 — Completed Cumulative Frequency Graph**

Topic 10: Box Plots

Q1 (Non-Calc):

50 [2m]

Q2 (Non-Calc):

Town B higher median (£50k vs £35k); Town B smaller IQR (£30k vs £40k, more consistent)

[2m]

Q3 (Non-Calc):

Min = 37, LQ = 39, Med = 50, UQ = 56, Max = 71 | IQR = 17

[3m]

Q4 (Non-Calc):

Min = 28, LQ = 33, Med = 47, UQ = 53, Max = 65 | IQR = 20

[3m]

Q5 (Non-Calc):

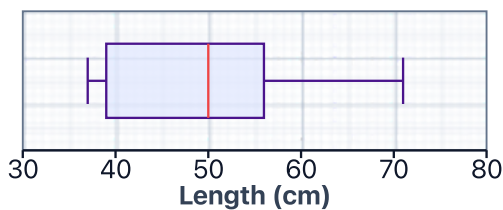
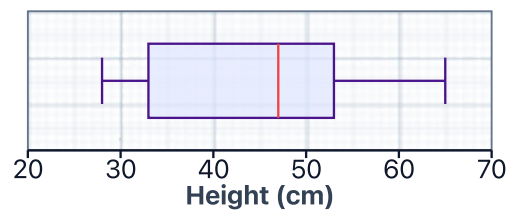
(a) UQ = 154 g, Max = 175 g | (b) 45 pears

[3m]

Q6 (Non-Calc):

Class B higher median (63 vs 48); Class A smaller IQR (13 vs 19, more consistent)

[3m]

Q3 — Completed Box Plot**Q4 — Completed Box Plot****Topic 11: Stratified Sampling**

Q1 (Calc):

13 [2m]

Q2 (Calc):

26 [2m]

Q3 (Calc):

21 [2m]

Q4 (Calc):

72 [2m]

Q5 (Non-Calc):

25 [2m]

Q6 (Calc):

 $\frac{14}{95}$ [3m]**Topic 12: Capture-Recapture**

Q1 (Calc):

144 [2m]

Q2 (Calc):

306 [2m]

Q3 (Calc):

1660 [2m]

Q4 (Calc):

 $M = 60$ [2m]

Q5 (Non-Calc):

(a) 300 | (b) Overestimate (dividing by fewer ringed birds)

[3m]

Q6 (Non-Calc):

Any two: tags stay on; random mixing; closed population (no births/deaths/migration)

[2m]

Mixed Review 1 — Choosing the Right Method (Non-Calculator) — Answers & Topic Guide

Q1 (Indices, Non-Calc):

 $\frac{4}{9}$ [2m]

Q2 (Recurring Decimals, Non-Calc):

Proof: $990x = 252$, so $x = \frac{252}{990} = \frac{14}{55}$

[3m]

Q3 (Triple Brackets, Non-Calc):

 $2x^3 - 3x^2 - 23x + 12$ [3m]

Q4 (Perpendicular Lines, Non-Calc):

 $y = -\frac{2}{3}x + 3$ [3m]

Q5 (Index Equations, Non-Calc):

 $x = 12$ [2m]

Q6 (Circle Theorems, Non-Calc):

 61° ($\angle ACB = 58^\circ$ alt. segment; $AC = BC$ gives 61°)

[3m]

Q7 (Negative Enlargements, Non-Calc):

$(-2, 1), (-6, 1),$
 $(-2, -5)$ (see diagram)

[3m]

Q8 (Product Rule, Non-Calc):

90 ($3 \times 6 \times 5$) [3m]

Q9 (Graphical Inequalities, Non-Calc):

20 integer points (see diagram)

[3m]

Q10 (Cumulative Frequency, Non-Calc):

(a) 20 min ($40 - 20$) |
(b) 30 [3m]

Q11 (Stratified Sampling, Non-Calc):

25 [3m]

Q12 (Invariant Points, Non-Calc):

(3, 5) [2m]

Q13 (Box Plots, Non-Calc):

Brand Y higher median
(28 h vs 24 h) &
smaller IQR (8 h vs
12 h)

[3m]

Q14 (Capture-Recapture, Non-Calc):

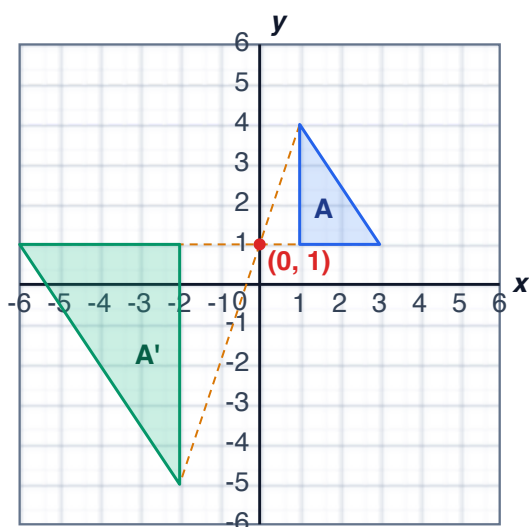
(a) 300 | (b) Random
mixing / marks stay on
/ closed pop. [3m]

Q15 (Circle Theorems, Non-Calc):

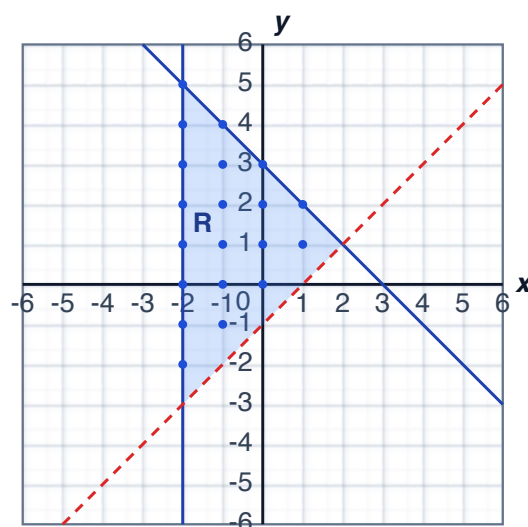
$\angle BOD = 148^\circ$ (at
centre);
 $\angle BCD = 106^\circ$ (cyclic
quad)

[3m]

Q7 — Completed Solution Diagram



Q9 — Completed Solution Diagram



Mixed Review 2 — Choosing the Right Method (Calculator) — Answers & Topic Guide

Q1 (Stratified Sampling, Calc):

22 (22.4 rounded) [2m]

Q2 (Triple Brackets, Calc):

$6x^3 + 13x^2 - 54x - 40$ [3m]

Q3 (Capture-Recapture, Calc):

420 [2m]

Q4 (Recurring Decimals, Calc):

$\frac{11}{18} (\frac{4}{9} + \frac{1}{6})$ [3m]

Q5 (Product Rule, Calc):

$120 (\frac{16 \times 15}{2})$ [2m]

Q6 (Perpendicular Bisectors, Calc):

$y = -\frac{1}{2}x + \frac{11}{2}$ (or
 $-0.5x + 5.5$) [4m]

Q7 (Graphical Inequalities, Calc):

$x \geq -1, y \geq 1,$
 $y < -2x + 5$ [3m]

Q8 (Reverse Stratified, Calc):

40 [3m]

Q9 (Index Equations, Calc):

$x = 2$ [3m]

Q10 (Circle Theorems, Calc):

32° ($\angle OTP = 90^\circ,$
 $\angle TOP = 64^\circ,$
 $\angle ABT = 32^\circ$) [3m]

Q11 (Box Plot
Summary, Calc):

Med 29, LQ 24, UQ 38,
IQR 14

[3m]

Q12 (Negative
Enlargements,
Calc):

$(-2, 0), (-5, 0),$
 $(-2, -3)$ **(see**
diagram)

[3m]

Q13 (Stratified
Probability, Calc):

$$\frac{1}{7} \left(\frac{6}{15} \times \frac{5}{14} \right)$$

[4m]

Q14 (Product
Rule, Calc):

$$x = 12 \text{ (} 13x = 156 \text{)}$$

[3m]

Q15 (Cumulative
Frequency, Calc):

(a) $(30, 10), (40, 28),$
 $(50, 56), (60, 72),$
 $(70, 80)$ | **(b)**
 $50 < s \leq 60$

[4m]

Q12 — Completed Solution Diagram

