Name	Date started	Target end date

WJEC GCSE Mathematics and Numeracy (Double Award) — Question Pack

Accurate construction with ruler and compasses — perpendicular bisector, angle bisector, dropping a perpendicular from a point to a line —

REVISE
.wales

2.14 — Geometric drawing & loci

Spec 3.2.1, 3.2.2, 3.2.3 — Unit 3 (calculator allowed)

Accurate construction with ruler and compasses — perpendicular bisector, angle bisector, dropping a perpendicular from a point to a line — and using these constructions to find a locus of points satisfying given conditions. Sourced from legacy WJEC GCSE Mathematics / Mathematics-Numeracy Higher non-calculator papers, organised for revision under the 2025 spec.

2025 SPECIFICATION

Estimated time for entire question pack: ~1 hours 6 minutes

*Derived from the GCSE Higher pace of **~1.5 min/mark** (44 marks across 12 questions).*

*You are advised to **not** attempt to complete all of this in one sitting.*

ABOUT THIS QUESTION PACK

This is a **focused single-topic practice pack**, not a single mock paper. Questions are organised against the 2025 specification.

Questions are ordered chronologically by sitting, with custom-written and SAM questions at the end.

INSTRUCTIONS

Use black ink or black ball-point pen. Show all working — method marks are awarded for clear setup.

A calculator is allowed on every question in this pack (Unit 3 is the calculator-allowed paper).

Geometric drawing & loci — what the new spec asks

WJEC GCSE Mathematics (first teaching 2025) · Unit 3: calculator-allowed.

Standard constructions 3.2

- Perpendicular bisector of a line segment.
- Bisector of a given angle.
- Perpendicular from a point to a line (or to a point on a line).
- Show all construction arcs — do not rub them out.

Drawing triangles 3.2

- SSS: arc from each endpoint with the side lengths as radii.
- SAS: draw the angle accurately first, then mark off the side lengths.
- Use a sharp pencil and check measurements before inking.

Loci of a single point or line 3.2

- Fixed distance from a point ⇒ a circle.
- Fixed distance from a line ⇒ two parallel lines.
- Equidistant from two points ⇒ perpendicular bisector.
- Equidistant from two lines ⇒ angle bisector.

Combined loci & regions 3.2

- Draw every locus on the same diagram.
- Shade the region that meets *all* the conditions.
- Pay attention to strict vs inclusive boundaries (‘more than’ vs ‘at least’).

Crib sheet »

Geometric drawing & loci in one page

Quick-reference notes — revisit before each question. Don't use during the questions.

What a locus is

A *locus* is the set of all points satisfying a given rule.

'Points $3\,\text{cm}$ from A' gives a circle of radius 3 centred on A.

'Points equidistant from line L' gives two parallel lines either side of L.

Perpendicular bisector

locus of points equidistant from A and B

Compass on A, radius $>$ half AB, arc above and below. Repeat from B. Draw the line through the two crossing points.

This line is perpendicular to AB and passes through its midpoint.

Angle bisector

locus of points equidistant from two lines

Compass on the vertex, arc through both arms. From the two new points, equal arcs that cross between the arms. Join the vertex to the crossing.

This line bisects the angle.

Perpendicular from a point to a line

Compass on the point P, swing an arc that cuts the line in two places.

From each cut, equal-radius arcs that cross on the other side of the line.

Join P to that crossing — this is the perpendicular from P to the line.

Construct an angle of 60°

Draw a base line. Compass on one endpoint, arc across the line and above. Same radius from the second cut: arcs cross above the base. Join the original endpoint to the crossing.

The angle at the endpoint is 60°.

Constructing a triangle

Given two sides and the included angle, or all three sides:

1. Draw the base side.
2. From each endpoint, swing an arc with the required radius.
3. The arcs cross at the third vertex — join up.

Leave all your construction arcs visible.

Region from multiple loci

Sketch each locus on the same diagram — circle, parallel lines, bisector — then shade the area that satisfies *all* the conditions.

Read the wording carefully: 'within', 'more than', 'closer to'.

Common traps

- Erasing construction arcs — examiners need to see them.
- Mixing up perpendicular bisector (between two *points*) and angle bisector (between two *lines*).
- Using a ruler to estimate instead of compasses to construct.

Examiner only

3. *Organics4U* is planning to have its headquarters in Wales.
The manager has instructed Ffion to look for a site for the headquarters.

Here are the instructions that Ffion has been given by her manager.

'Find the point that is
- an equal distance between Wrexham and Aberporth, and
- an equal distance between Caernarfon and Swansea.

The new headquarters needs to be within 20 miles of this point.'

On the map below, shade the region, **in Wales**, that Ffion should identify for her manager. [4]

Examiner only

1. Alptai is a ski resort.
The daily snowfall for January is given in the table below.

Daily snowfall, s (cm)	Number of days
$0 \leqslant s < 5$	10
$5 \leqslant s < 10$	16
$10 \leqslant s < 20$	4
$20 \leqslant s < 30$	0
$30 \leqslant s < 50$	1

(a) Calculate an estimate for the mean daily snowfall for the 31 days of January. [4]

(b) Circle either TRUE or FALSE for each of the following statements. [2]

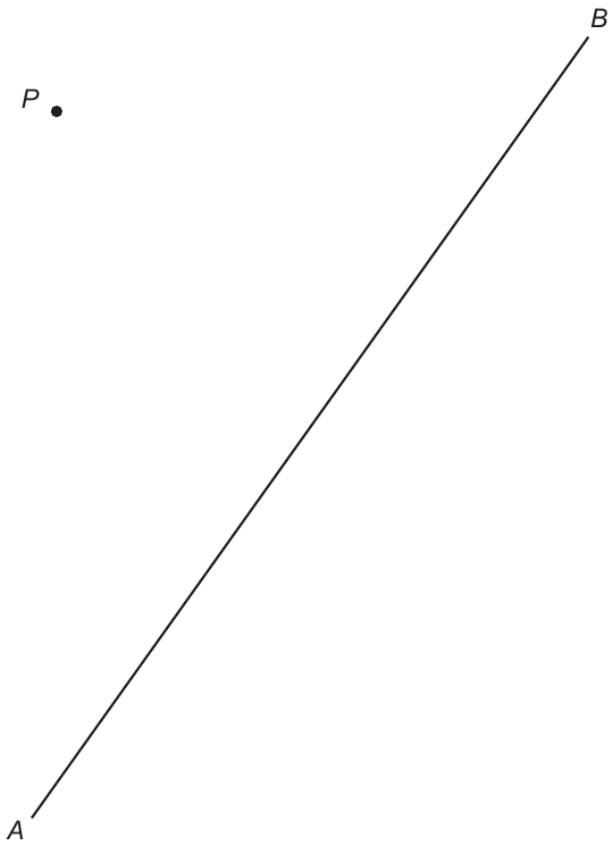
The table above shows that there definitely was snowfall on each of the 31 days in January.	TRUE	FALSE
There were 16 days when the daily snowfall was less than 10 cm.	TRUE	FALSE
There was only 1 day with snowfall greater than or equal to 20 cm.	TRUE	FALSE
The modal group also contains the median daily snowfall.	TRUE	FALSE

Examiner only

(c) For the 28 days of February, the mean daily snowfall in Alptai was 9 cm.
On 1st February, the snowfall recorded in Alptai was 63 cm.
Calculate the mean daily snowfall for the 27-day period 2nd to 28th February. [3]

Examiner only

6. Using only a ruler and a pair of compasses, construct a perpendicular line from the point P to the line AB. [3]



Examiner only

8. The line AB is drawn below.
The point P lies **above** the line AB.

The region in which P is located is such that

- P is nearer to point A than to point B,
- $B\hat{A}P \leqslant 60°$,
- $AP \geqslant 6\,\text{cm}$.

Using a ruler and a pair of compasses, **construct** suitable lines and arcs to represent these conditions.
Construction arcs must be clearly shown.

Shade the region in which the point P is located. [5]

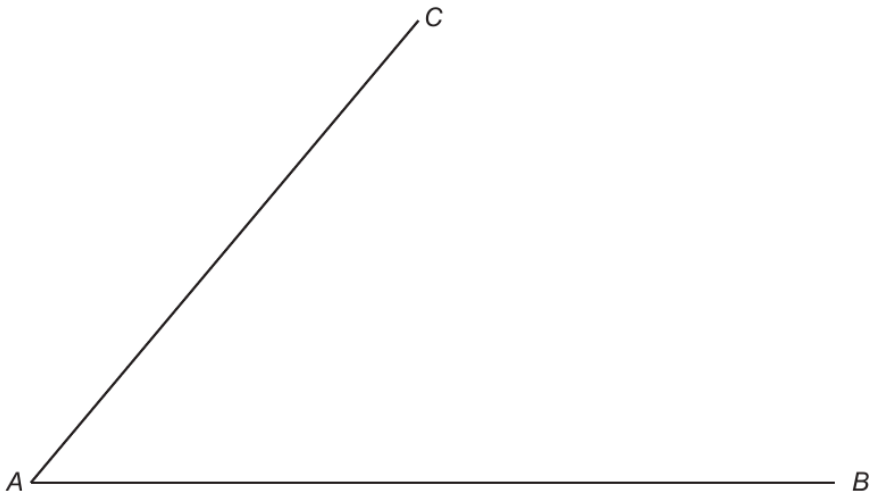
Examiner only

2. Two straight lines, *AB* and *AC*, are shown below.

The point *P* is

- equidistant from line *AB* and line *AC*,
- 6 cm from point *B*,
- **more** than 10 cm from point *A*.

Show clearly the position of point *P*. [3]



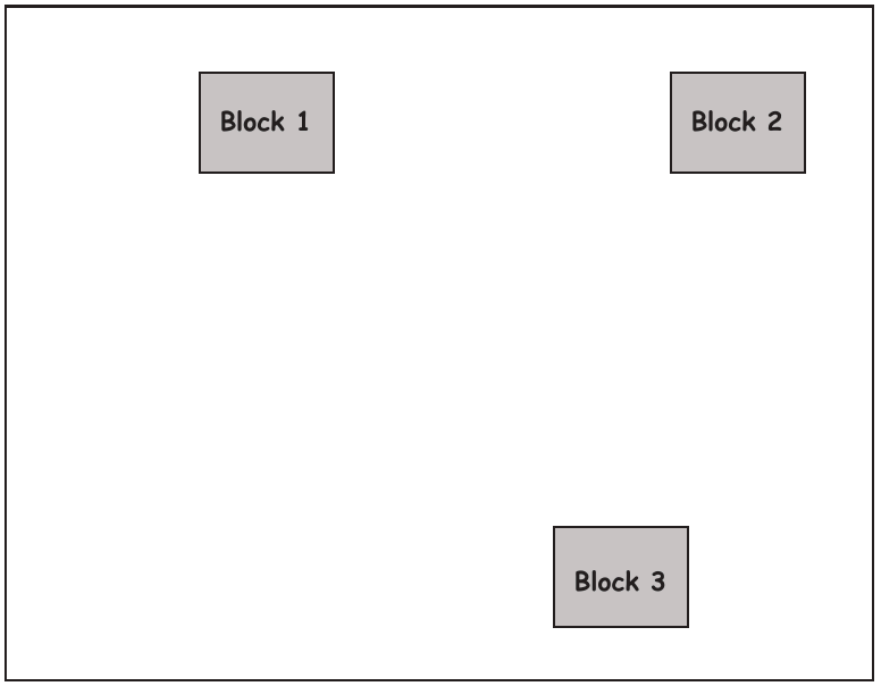
3. *(a)* Share £720 in the ratio 2 : 7. [2]

(b) Calculate the value of the reciprocal of 0·2. [2]

Examiner only

2. A builder has drawn a plan for building 3 office blocks on a plot of land.
They are numbered 1, 2 and 3, as shown below.

The scale of the plan is **1 cm represents 20 m**.



(a) The builder is planning to plant a tree so that it is:
- the same distance from Block 1 as it is from Block 2,
- 80 metres from the top left hand corner of Block 3.

Mark the position for the planting of the tree. [3]

(b) What is the shortest possible distance between Block 2 and Block 3? [1]

..... metres

Examiner only

4. The point P is such that:

- P lies on the perpendicular bisector of the line AB,
- $B\hat{A}P = 30°$.

Using only a ruler and a pair of compasses, show one of the possible positions of P.
All construction lines and arcs must be shown. [4]

Examiner only

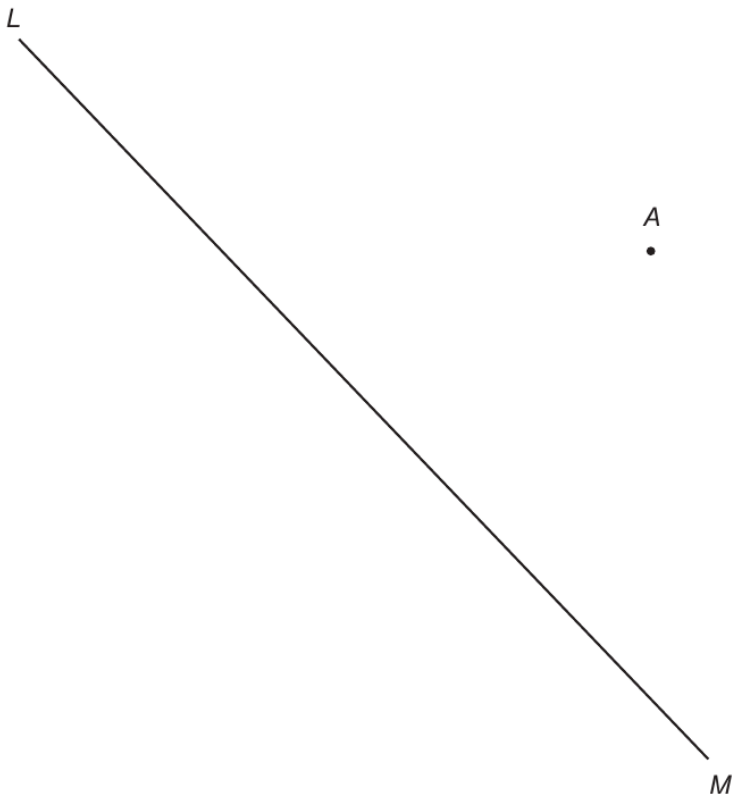
5. *(a)* Using only a ruler and a pair of compasses, construct a triangle PQR, so that it satisfies **both** of the following conditions:

- $P\hat{Q}R = 60°$,
- $PQ = 7\,\text{cm}$.

Side QR has been drawn for you. [2]

Examiner only

(b) Using only a ruler and a pair of compasses, construct a line from the point *A* that is perpendicular to the line *LM*. [2]



Examiner only

2. Triangle *ABC* is shown in the diagram below.
Using only a ruler and a pair of compasses, construct an accurate drawing of triangle *ABC*.
Side *AC* has been drawn for you.
All construction lines and arcs must be shown. [3]

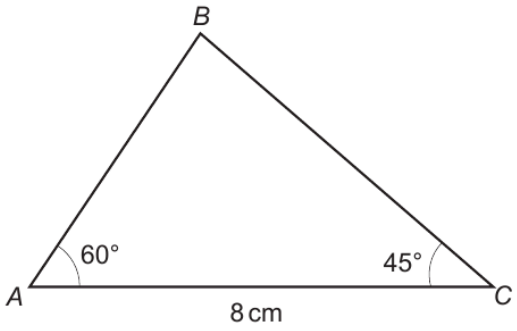
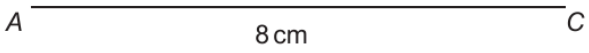


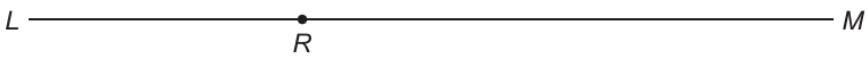
Diagram not drawn to scale



Examiner only

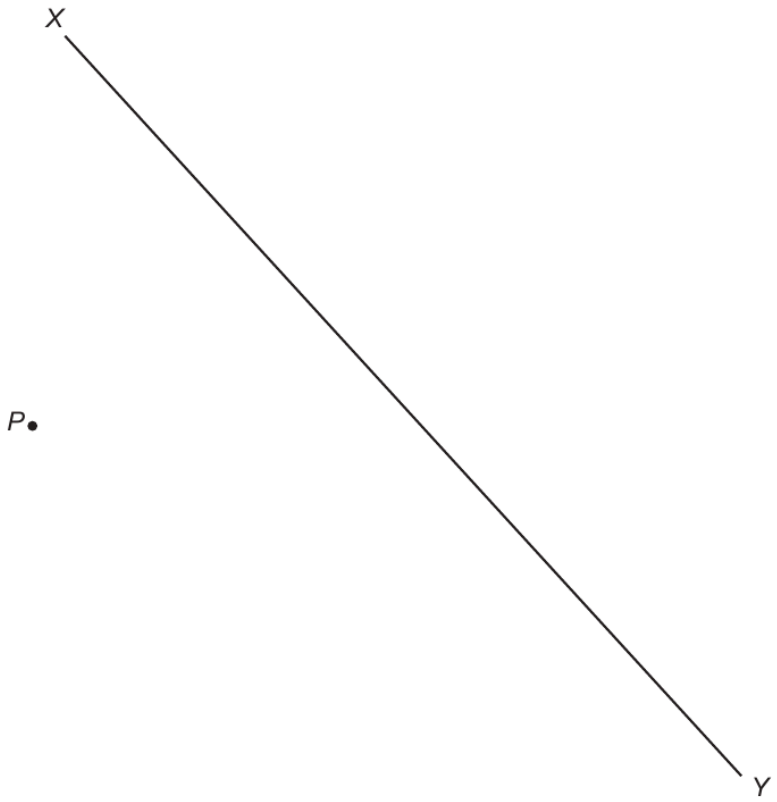
4. (a) Line *AB* is shown below.
Using only a ruler and a pair of compasses, construct an angle of 60° at point *B*. [1]

(b) *R* is a point on the line *LM*.
Using only a ruler and a pair of compasses, construct an angle of 90° at point *R*. [1]



Examiner only

(c) Using only a ruler and a pair of compasses, construct a perpendicular line from the point *P* to the line *XY*. [2]



Examiner only

3. Point *P* lies on:

- the bisector of angle *ABC*
- the perpendicular bisector of line *BC*.

Using only a ruler and a pair of compasses, **construct** suitable lines and arcs to show the position of point *P*.

Construction arcs must be clearly shown. [3]

Examiner only

6. Line AB is drawn below.
Point C lies **below** the line AB.
The region in which point C is located is such that:

- $A\hat{B}C \leqslant 30°$
- line $BC \leqslant 5\,\text{cm}$.

Use a ruler and a pair of compasses to **construct** suitable arcs and lines to show this region.
You must show your construction arcs.
Shade the region in which point C is located. [4]