Name	Date started	Target end date

WJEC Level 2 Additional Mathematics — Question Pack

Finding stationary points by setting dy/dx = 0 and classifying each as a maximum or minimum.

REVISE
.wales

Stationary points

Calculus · Level 2 Certificate (9550) · calculator allowed

Finding stationary points by setting dy/dx = 0 and classifying each as a maximum or minimum.

LEVEL 2 · 9550

Estimated time for entire question pack: ~1 hours 32 minutes

*At the Additional Maths pace of **~1.2 min/mark** (77 marks across 11 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. It gathers every question on this topic from the 2011–2024 papers.

Questions are ordered by year, newest first.

INSTRUCTIONS

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

A calculator is allowed throughout this qualification.

Stationary points — what's examined

WJEC Level 2 Additional Mathematics (9550) · single written paper, calculator allowed.

Finding them Calculus

- Differentiate and set dy/dx = 0.
- Solve for x.
- Find the y-coordinate for each.

Classifying Calculus

- Use the second derivative, or
- test the gradient either side.
- State maximum or minimum.

Method Method

- Give coordinates of each point.
- Justify the nature of each.
- Show the derivative work.

Crib sheet »

Stationary points in one page

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

Stationary point

$$\mathrm{d}y/\mathrm{d}x = 0$$

Second-derivative test

$\mathrm{d}^2y/\mathrm{d}x^2 > 0$: minimum

$\mathrm{d}^2y/\mathrm{d}x^2 < 0$: maximum

Gradient test

Check the sign of dy/dx just before and after the point.

Coordinates

Always give the y-value too — substitute x back into the curve.

15. Find the coordinates and the nature of each of the stationary points on the curve

$$y = 2x^3 - 6x^2 - 7.$$

You must show all your working. [7]

13. Find the x**-coordinate** and the nature of each of the stationary points on the curve

$$y = \frac{x^3}{3} + x^2 - 15x.$$

You must show all your working. [7]

13. Find the x-coordinate and the nature of each of the stationary points on the curve

$$y = \frac{x^3}{3} - \frac{7x^2}{2} + 10x\,.$$

You must show all your working. [7]

8. Find the coordinates and nature of each of the stationary points on the curve $y = 4x^3 - 3x^2 + 20$.

You must show all your working. [7]

9. **Do not use a calculator** to answer this question.
You **must** show all your working.

Simplify $\sin 60° \times \cos 60°$. [1]

10. The coordinates of the points *F* and *G* are (–4, 10) and (8, 28) respectively.

(a) Calculate the length of the line *FG*.
Give your answer in the form $m\sqrt{n}$. [2]

(b) Find the gradient of the straight line that passes through points *F* and *G*. [2]

13. Find the coordinates and the nature of each of the stationary points on the curve $y = 2x^3 + 12x^2 + 11$.
You must show all your working. [7]

11. Find the coordinates and the nature of each of the stationary points on the curve $y = 3x^3 + 9x^2 + 4$.
You must show all your working. [7]

8. Find the coordinates and nature of each of the stationary points on the curve $y = x^3 - 3x^2 + 11$. You must show all your working. [7]

9. Do **not** use a calculator to answer any part of this question.
You must show all your working.

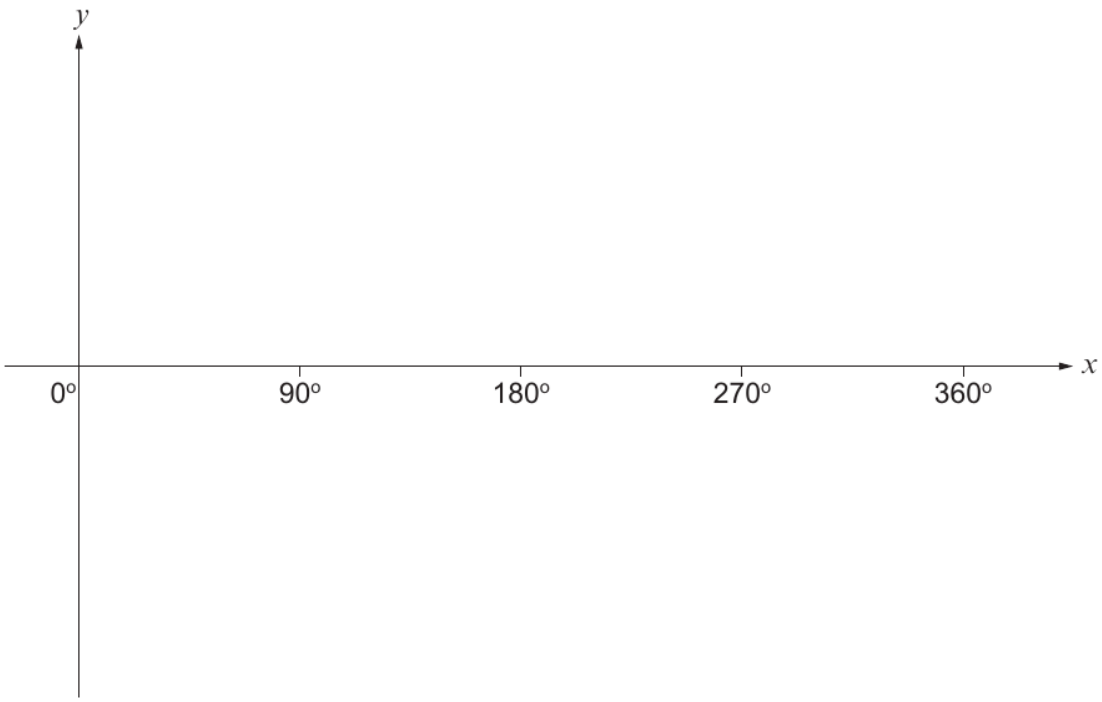
(a) Simplify $\frac{\cos 45°}{\sin 45°}$. [1]

(b) Express $\frac{\sin 30°}{\tan 60°}$ in the form $\frac{\sqrt{a}}{b}$, where a and b are integers to be found. [2]

(c) $(\sin 60°)^2$ is written $\sin^2 60°$.
Simplify $\sin^2 60° + \tan^2 45°$. [2]

14. Find the coordinates and the nature of each of the stationary points on the curve $y = 2x^3 - 24x + 13$.
You must show all your working. [7]

15. *(a)* On the axes below, sketch the graph of $y = 5\cos x$ for values of x from 0° to 360°. [2]



(b) Find all the solutions of the equation $5\cos x = 0$ for values of x from 0° to 360°. [1]

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8. Find the coordinates and nature of each of the stationary points on the curve $y = 4x^3 - 12x + 7$. You must show all your working. [7]

9.

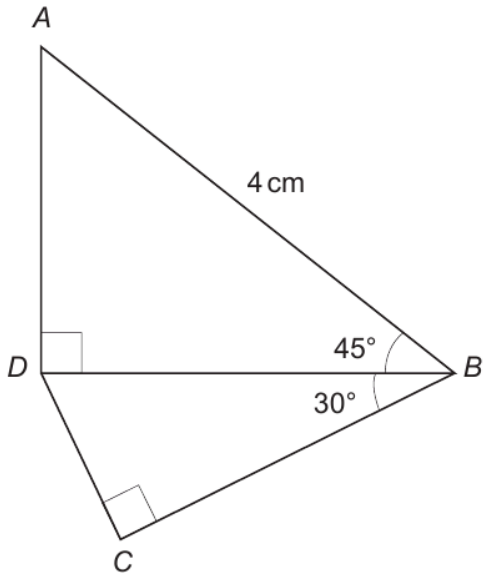

Diagram not drawn to scale

Calculate the length of *BC*.
Give your answer in surd form.
Do not use your calculator to answer this question.
You must show all your working. [7]

12. Find the coordinates and the nature of each of the stationary points on the curve $y = 3x^3 - 36x + 11$. You must show all your working.

[7]

13. Find the equation of the tangent to the curve $y = 3x^2 + 4x$ at the point where $x = 2$.
Give your answer in the form $ax + by + c = 0$.

[6]

10. Find the coordinates and nature of each of the stationary points on the curve $y = 2x^3 - 6x + 5$. You must show all your working.

[7]

End of question pack