FREE SAMPLE: THE FIRST 3 QUESTIONS

SECTION A · PURE MATHEMATICS

Pure Mathematics · 50 marks · Questions 1 – 9

Answer ALL questions in Sections A and B. The paper lasts 2 hours and carries 100 marks: Section A is worth 50 marks and Section B is worth 50 marks. The first questions in each section are one-mark multiple-choice items. Show all necessary working. Unless a question says otherwise, give non-exact numerical answers to three significant figures.

1. Find the magnitude of the vector 2i − 6j − 3k. Circle the correct answer. [1 mark]

A 49

B 7

C 48

D 11

2. The graph of y = f(x) is transformed to the graph of y = f(6x + 1). Which sequence of transformations produces this? Circle your answer. [1 mark]

A a stretch in the x-direction with scale factor $\frac{1}{6}$, then a translation of 1 unit in the negative x-direction

B a translation of 1 unit in the negative x-direction, then a stretch in the x-direction with scale factor 6

C a translation of 1 unit in the positive x-direction, then a stretch in the x-direction with scale factor $\frac{1}{6}$

D a translation of 1 unit in the negative x-direction, then a stretch in the x-direction with scale factor $\frac{1}{6}$

3. A point on the curve y = ln(2x² + 5) has x = 1. Work out the gradient of the curve at this point. Circle the correct answer. [1 mark]

A $\frac{1}{7}$

B 4

C $\frac{4}{7}$

D $\frac{2}{7}$

TES... APERS HUB - NOT FOR RESALE O ...ISTRIBUTION

THE WORKED ANSWERS TO THOSE 3 QUESTIONS

1. Find the magnitude of the vector 2i − 6j − 3k. Circle the correct answer. [1 mark] [Vectors]

Correct answer: B — 7

- Magnitude = √(sum of squares of the components) = $\sqrt{(2^2 + 6^2 + 3^2)}$.
- = √49 = 7.
- Marks (TPH scheme): B1 [AO1]. The other options come from common slips: a wrong formula, a wrong sign or a missed step.

LOS: Pure Mathematics · Vectors

> **KEY TAKEAWAY**
> Magnitude is the square root of the sum of the squared components.

2. The graph of y = f(x) is transformed to the graph of y = f(6x + 1). Which sequence of transformations produces this? Circle your answer. [1 mark] [Functions and graphs]

Correct answer: D — a translation of 1 unit in the negative x-direction, then a stretch in the x-direction with scale factor $\frac{1}{6}$

- Start from y = f(x). Translating 1 unit in the negative x-direction gives y = f(x + 1).
- Replacing x by 6x in that equation gives y = f(6x + 1), and replacing x by 6x is a stretch in the x-direction with scale factor $\frac{1}{6}$.
- So the sequence is a translation then a stretch, as stated.
- Marks (TPH scheme): B1 [AO1]. The other options come from common slips: a wrong formula, a wrong sign or a missed step.

LOS: Pure Mathematics · Functions and graphs

> **KEY TAKEAWAY**
> Apply the changes to x in the same order as they are built: x → x + t first, then x → sx.

3. A point on the curve y = ln(2x² + 5) has x = 1. Work out the gradient of the curve at this point. Circle the correct answer. [1 mark] [Differentiation]

Correct answer: C — $\frac{4}{7}$

- Use the chain rule: dy/dx = (derivative of the inside) ÷ (the inside) = 4x ÷ (2x² + 5).
- At x = 1 the gradient is $\frac{4}{7}$.
- Marks (TPH scheme): B1 [AO1]. The other options come from common slips: a wrong formula, a wrong sign or a missed step.

LOS: Pure Mathematics · Differentiation

> **KEY TAKEAWAY**
> The derivative of ln of a function is the derivative of the function divided by the function.

TEST PAPERS HUB NOT FOR RE... REDISTRIBUTION