

IGCSE Maths 4MA1 Statistics, Vectors, Proof and Calculus Practice Exam

Pearson Edexcel International GCSE Mathematics A (4MA1), Higher tier · 17 questions · 49 marks

Name _____

Date _____

Score / 49

- Answer every question. Show your working: most marks are for method.
- Calculator allowed.
- Topics: Cumulative Frequency 1; Proof; Differentiation; Venn Diagrams; Vectors.
- The mark scheme is a separate free PDF: [igcsemathrevision.com/igcse-frontend/downloads/practice-exams/4ma1/igcse-maths-4ma1-statistics-vectors-proof-and-calculus-practice-exam-mark-scheme.pdf](https://www.igcsemathrevision.com/igcse-frontend/downloads/practice-exams/4ma1/igcse-maths-4ma1-statistics-vectors-proof-and-calculus-practice-exam-mark-scheme.pdf)

1. In a cumulative frequency table for the masses of parcels, the cumulative frequency for $m \leq 60$ kg is 38 and the cumulative frequency for $m \leq 70$ kg is 71. How many parcels have a mass in the class $60 < m \leq 70$? [1]
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2. Prove that the product of an even number and an odd number is always even. [2]
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3. The cumulative frequency table gives the heights, h cm, of 120 students. $h \leq 150$: 9; $h \leq 155$: 27; $h \leq 160$: 58; $h \leq 165$: 91; $h \leq 170$: 110; $h \leq 175$: 120. Which class interval contains the median height? [2]
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4. n is an integer. Show that $5(n + 3) - 3(n + 5)$ is always even. [2]
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5. A particle moves along a straight line. Its displacement, s metres, from a fixed point O at time t seconds is $s = 4t^3 - 2t$. Find the velocity of the particle when $t = 2$. [2]
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6. $n(\xi) = 90$, $n(A) = 48$, $n(B) = 35$ and $n(A' \cap B') = 22$. Find $n(A \cap B)$. [3]
|



7. $\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$. P lies on AB with $AP : PB = 1 : 3$. Find $\overrightarrow{OP}$ in terms of $\mathbf{a}$ and $\mathbf{b}$. Give your answer in its simplest form. [3]
8. Prove that $(5n + 1)^2 - (n + 5)^2$ is a multiple of 24 for every integer n . [3]
9. $n(\xi) = 40$, $n(A) = 25$ and $n(B) = 22$. Find the least possible value of $n(A \cap B)$. [2]
10. The lifetimes, t hours, of 200 batteries are summarised: $t \leq 10$: 14; $t \leq 15$: 52; $t \leq 20$: 118; $t \leq 25$: 173; $t \leq 30$: 200. The cumulative frequency graph is drawn by joining the plotted points with straight lines. Use it to estimate how many batteries lasted more than 22 hours. [3]
11. Prove that when any odd number is squared and 7 is added, the result is always a multiple of 8. [3]
12. n is an integer. Prove that $(n + 3)^3 - (n + 1)^3 - 2$ is always 6 times the square of an integer. [3]
13. The displacement of a particle is given by $s = 2t^3 - 15t^2 + 36t$, where s is in metres and t is in seconds. Find the acceleration of the particle when $t = 1$. [3]
14. $\overrightarrow{OA} = 4\mathbf{a}$ and $\overrightarrow{OB} = 4\mathbf{b}$. P is the midpoint of OA. Q lies on AB with $AQ : QB = 3 : 1$. R lies on OB extended so that $\overrightarrow{OR} = 6\mathbf{b}$. (a) Find $\overrightarrow{PQ}$ in terms of $\mathbf{a}$ and $\mathbf{b}$. (b) Prove that P, Q and R lie on a straight line. [4]



15. PQRS is a quadrilateral in which PQ is parallel to SR. The bisector of angle QPS and the bisector of angle PSR meet at the point T. Prove that angle $PTS = 90^\circ$. [4]
16. ABC is a triangle with $AB = AC$. D is the point on BC such that AD bisects angle BAC. (a) Prove that triangle ABD is congruent to triangle ACD. (b) Hence prove that AD is perpendicular to BC. (c) BC = 10 cm and AB = 13 cm. Work out the length of AD. [5]
17. A particle moves along a straight line. Its displacement, s metres, from a fixed point O at time t seconds is $s = t^3 - 9t^2 + 24t + 2$. Find the displacement of the particle from O at each time when it is instantaneously at rest. [4]

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