

EXAMPLE GRAMMAR SCHOOL

ESAT Mock Examination

Mathematics 1

Paper SMP-2026-09 · Version 1.0

NAME

TEACHING GROUP

DATE

Instructions

- Time allowed: **15 minutes**.
- There are **10 multiple-choice questions**. Each is worth 1 mark.
- There is no negative marking. Answer every question, even if you have to guess.
- Calculators are not permitted.
- Record your answers on the separate answer sheet. Only the answer sheet is marked.
- Formulae are not provided. The ESAT does not supply a formula sheet.

Note: the real ESAT is sat on screen at a Pearson test centre. This paper trains the mathematics and the pacing, not the on-screen interface.

Written for Example Grammar School by Lucas Rey, Engineering Science, University of Oxford; MRes, University of Cambridge.

Question 1

A winch unwinds 0.75 km of uniform steel cable of linear density 12 g cm^{-1} . Find its mass.

- A. 900 kg
- B. 90 kg
- C. 625 kg
- D. 9 kg
- E. 90000 kg
- F. 9000 kg
- G. 0.9 kg
- H. 0.09 kg

Question 2

A ski tow climbs a uniform slope in a straight line. The cable rises 1.5 m for every 2 m of horizontal distance. Find the height gained along 20 m of cable.

- A. 15 m
- B. 12 m
- C. 6 m
- D. 16 m
- E. 8 m

Question 3

240 g of alloy occupies 30 cm^3 , each to the nearest ten. Find the greatest density.

- A. 9.4 g cm^{-3}
- B. 9.8 g cm^{-3}
- C. 8 g cm^{-3}
- D. 10 g cm^{-3}
- E. 7 g cm^{-3}
- F. 9.6 g cm^{-3}
- G. 12 g cm^{-3}
- H. 12.5 g cm^{-3}

Question 4

A start-up's cash balance C , in thousands of pounds, at the end of month x is modelled by $C = (x - 1)(x - 5)$, valid for months 0 to 6. Treating x as continuous, what is the lowest balance predicted?

- A. $-\$3000$
- B. $\$0$
- C. $-\$9000$
- D. $\$5000$
- E. $-\$4000$
- F. $\$1000$
- G. $-\$14000$
- H. $\$3000$

Question 5

Decrease 80 by 15%.

- A. 92
- B. 68
- C. 65
- D. 94.12
- E. 12

Question 6

A park has a lawn shaped like a sector of a circle. Two straight paths of equal length run from a single corner to the ends of a curved hedge, which forms the lawn's outer boundary. The hedge measures 12π m and the lawn covers $90\pi \text{ m}^2$. Find the angle between the two paths.

- A. 288°
- B. 72°
- C. 15°
- D. 48°
- E. 40°
- F. 36°
- G. 144°
- H. 216°

Question 7

A camera's light meter plots the correct exposure time t , in milliseconds, against the aperture area A , in mm^2 . The plotted curve is a hyperbola in the first quadrant, falling steeply and approaching both axes without ever meeting them. One recorded setting has $A = 8$ and $t = 45$. What exposure time does the curve give when $A = 12$?

- A. 41 ms
- B. 22.5 ms
- C. 20 ms
- D. 101.25 ms
- E. 90 ms
- F. 3.75 ms
- G. 67.5 ms
- H. 30 ms

Question 8

A battery is $\frac{3}{4}$ charged. Using 0.35 of its capacity leaves what percentage?

- A. 40%
- B. 110%
- C. 48.75%
- D. 60%
- E. 74.65%
- F. 71.5%
- G. 65%
- H. 26.25%

Question 9

A vineyard's yield falls by 20% each year while a disease goes untreated. Three harvests after it appeared the yield is 2560 kg. How large was the last healthy harvest?

- A. 6400 kg
- B. 4480 kg
- C. 3200 kg
- D. 4096 kg
- E. 5120 kg
- F. 4000 kg
- G. 6250 kg
- H. 5000 kg

Question 10

A courier walks 4 blocks east and 2 north. How many routes are possible?

- A. 8
- B. 360
- C. 30
- D. 6
- E. 64
- F. 15
- G. 720
- H. 10

END OF PAPER

Questions 11 to 27 are in the full paper

This is an extract. The 10 questions before this page are real questions from a commissioned question paper, shown in full and with nothing withheld, so that the standard can be judged rather than described.

The rest of the paper is not hidden behind this page. It was never in this file. Each commissioned paper is written for one school, recorded against it, and issued to no other, so the questions in it are not published anywhere, including here.

A commissioned paper is NOT this paper with the missing questions restored. Every question in it is different from every question here, the 10 shown above included. Your school's paper is drawn fresh, and no question that has ever been published, on this page or anywhere else, can appear in it.

A full paper runs to 27 questions in this module alone, with a question paper, an answer sheet, a mark scheme and a worked solution for every question, across all five ESAT modules.

Commission a paper for your school

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Written by researchers in engineering, physics and mathematics at Oxford and Cambridge, and checked question by question before it is issued.

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