**Mathematics: applications and interpretation**
**Higher level**
**Paper Example**

Wednesday 20 April 2022

50 minutes

Student name

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**Instructions to candidates**

- Write your name in the box above.
- Do not open this examination paper until instructed to do so.
- A graphic display calculator is required for this paper.
- Answer all questions.
- Answers must be written within the answer boxes provided.
- Unless otherwise stated in the question, all numerical answers should be given exactly or correct to three significant figures.
- A clean copy of the **mathematics: applications and interpretation formula booklet** is required for this paper.
- The maximum mark for this examination paper is **[20 marks]**.

| Q: | 1 | 2 | 3 |
|---|---|---|---|
| Marks: | /4 | /8 | /8 |

| **Total** |
|---|
| **/20** |

6 pages

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Answers written on this page
will not be marked.

Answers must be written within the answer boxes provided. Full marks are not necessarily awarded for a correct answer with no working. Answers must be supported by working and/or explanations. Solutions found from a graphic display calculator should be supported by suitable working. For example, if graphs are used to find a solution, you should sketch these as part of your answer. Where an answer is incorrect, some marks may be given for a correct method, provided this is shown by written working. You are therefore advised to show all working.

**1.** [Maximum mark: 4]

George goes fishing. From experience he knows that the mean number of fish he catches per hour is $1.1$. It is assumed that the number of fish he catches can be modelled by a Poisson distribution.

On a day in which George spends $8$ hours fishing, find the probability that he will catch more than $9$ fish.

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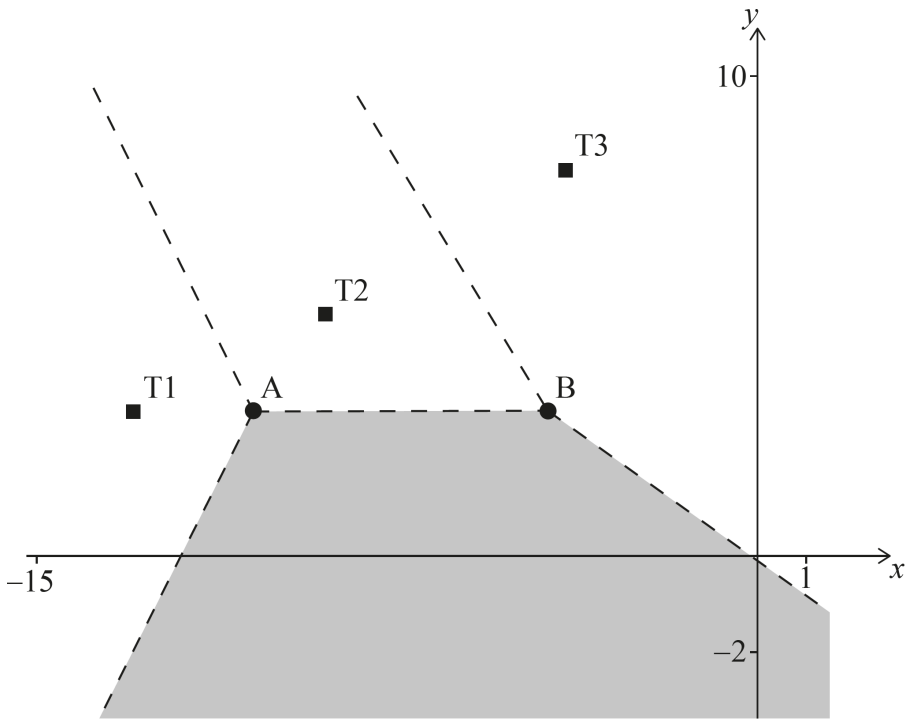
**2.** [Maximum mark: 8]

The Voronoi diagram below shows three identical cellular phone towers, T1, T2 and T3. A fourth cellular phone tower, T4 is located in the shaded region. The dashed lines in the diagram below represent the edges in the Voronoi diagram.

Horizontal scale: 1 unit represents 1 km.
Vertical scale: 1 unit represents 1 km.




Tim stands inside the shaded region. [2]

(a) Explain why Tim will receive the strongest signal from tower T4. [1]

Tower T2 has coordinates $(-9, 5)$ and the edge connecting vertices A and B has equation $y = 3$.

(b) Write down the coordinates of tower T4. [2]

Tower T1 has coordinates $(-13, 3)$.

(c) Find the gradient of the edge of the Voronoi diagram between towers T1 and T2. [3]

**(This question continues on the following page)**

**(Question 2 continued)**

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**3.** [Maximum mark: 8]

Charlie and Daniella each began a fitness programme. On day one, they both ran $500\,\text{m}$. On each subsequent day, Charlie ran $100\,\text{m}$ more than the previous day whereas Daniella increased her distance by $2\,\%$ of the distance ran on the previous day.

(a) Calculate how far

(i) Charlie ran on day $20$ of his fitness programme.

(ii) Daniella ran on day $20$ of her fitness programme. [5]

On day $n$ of the fitness programmes Daniella runs more than Charlie for the first time.

(b) Find the value of $n$. [3]

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**END OF EXAM**

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