1. Find

$$\int \left(3x^2 - 2\right)\left(\frac{2}{x^2} + 4\right) \mathrm{d}x$$

giving the answer in simplest form.

(5)

(Total for Question 1 is 5 marks)

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2. **In this question you must show all stages of your working.**
Solutions relying entirely on calculator technology are not acceptable.

A tree was planted.

Exactly 2 years after it was planted, the height of the tree was 2.70 m.

Exactly 7 years after it was planted, the height of the tree was 4.50 m.

Given that t years after it was planted, the height of the tree, H metres, is modelled by the equation

$$H = \frac{at + b}{t + 4}$$

where a and b are constants,

(a) find the complete equation of the model.

(4)

(b) Hence find, according to the model, the height of the tree when it was planted.

(2)

(Total for Question 2 is 6 marks)

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3. **In this question you must show all stages of your working.**

In triangle ABC,

- $AC = 12$ cm
- $AB = 8$ cm
- angle $BCA = 32°$
- angle $CBA = \theta°$

(a) Find both possible values for θ, giving each answer to 2 decimal places.

(3)

Given that $\theta > 90$

(b) find, to 3 significant figures, the length of BC,

(2)

(c) find, to 3 significant figures, the area of the triangle.

(2)

(Total for Question 3 is 7 marks)

4. **In this question you must show all stages of your working.**
Solutions relying on calculator technology are not acceptable.

(i) Using the laws of indices, solve

$$2^{3p-5} = \frac{1}{16}\sqrt{128}$$

(3)

(ii) Find the real roots of the equation

$$\left(x^2 - 2\right)^2 = x^2 + 18$$

(4)

(Total for Question 4 is 7 marks)

