1 The population of Ethiopia is $5{\cdot}2 \times 10^7$.

(a) How many million people is this?

(a) ..... [1]

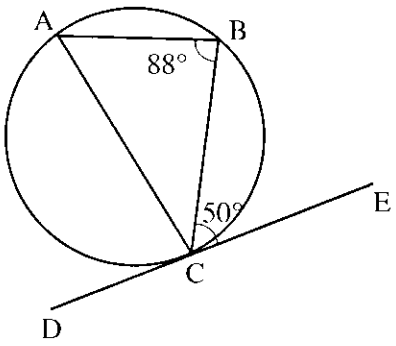
(b) There are about 600 doctors in Ethiopia.

Estimate the number of doctors per million people.

(b) ..... [2]

3

2 Triangle ABC is inscribed in a circle.
The tangent DE touches the circle at C.
Angle ABC = 88°.
Angle BCE = 50°.



Not to scale

(a) Explain how you know that AC is **not** a diameter of the circle.

..... [1]

(b) Calculate the size of angle ACB.
Explain your answer, giving clear geometrical justifications.

.....

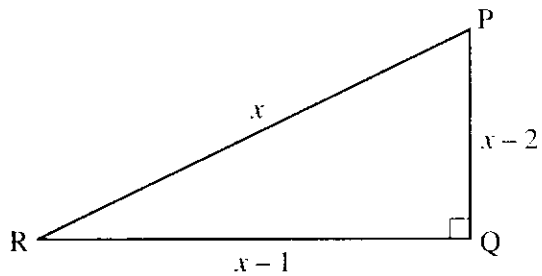
.....

..... [2]

3

[Turn over

3 PQR is a right-angled triangle.
All lengths shown in the diagram are in centimetres.



Not to scale

(a) (i) Use Pythagoras' theorem to write down an equation in x.

..... [1]

(ii) Show that the equation simplifies to $x^2 - 6x + 5 = 0$.

.....

.....

..... [2]

(b) (i) Solve by factorising.

$$x^2 - 6x + 5 = 0$$

(b)(i) ..... [3]

(ii) Hence find the lengths of the sides of the triangle.

(ii) PR = ...cm, PQ = ...cm, RQ = ...cm [1]

[7]

4 Work out.

(a) $(125)^{\frac{1}{3}}$

(a) ..... [1]

(b) $\dfrac{3^{-3} \times 3^{7}}{3^{0}}$

(b) ..... [2]

3

5 You are given that $T \propto \dfrac{1}{R^2}$, and $T = 8$ when $R = 5$.

Find the equation connecting T and R.

..... [2]

2

6 **(a)** Factorise.

$$x^2 - 4y^2$$

(a) ..... [2]

(b) Simplify.

$$\frac{x^2 - 4y^2}{5x + 10y}$$

(b) ..... [2]

4

7 Rearrange the formula $T = 2\pi\sqrt{\frac{L}{G}}$ to make L the subject.

..... [3]

3