Dr Oliver Mathematics
Mathematics Standard Grade: Credit Level
2012 Paper 1: Non-Calculator
55 minutes

The total number of marks available is 37.
You must write down all the stages in your working.

1. Evaluate (2)

$$7.2 - 0.161 \times 30.$$

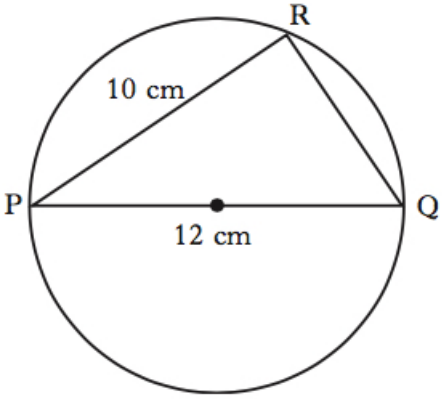
2. Expand and simplify (3)

$$(3x - 2)(2x^2 + x + 5).$$

3. Change the subject of the formula to m: (2)

$$L = \frac{\sqrt{m}}{k}.$$

4. In the diagram, (4)
   PQ is the diameter of the circle
   $PQ = 12$ centimetres, and
   $PR = 10$ centimetres.

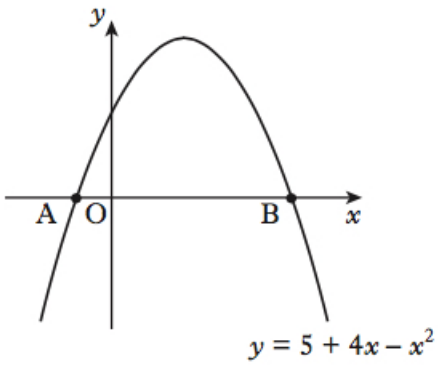


   Calculate the length of QR.
   Give your answer as a surd in its simplest form.

5. Mike is practising his penalty kicks. (3)
   Last week, Mike scored 18 out of 30.
   This week, he scored 16 out of 25.
   Has his scoring rate improved?
   Give a reason for your answer.

6. The diagram shows part of the graph of

$$y = 5 + 4x - x^2.$$



A is the point $(-1, 0)$.
B is the point $(5, 0)$.

(a) State the equation of the axis of symmetry of the graph. (2)

(b) Hence, find the maximum value of $y = 5 + 4x - x^2$. (2)

7. Given (4)

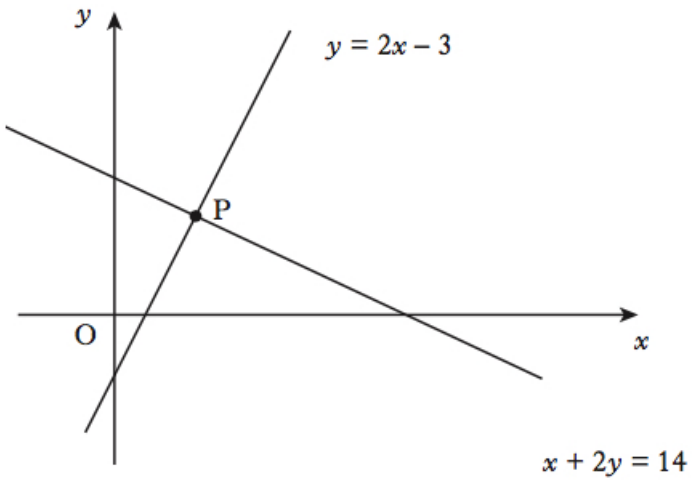
$$2x^2 - 2x - 1 = 0,$$

show that

$$x = \frac{1 \pm \sqrt{3}}{2}.$$

8. The graph below shows two straight lines: (4)

$$y = 2x - 3$$
$$x + 2y = 14.$$



The lines intersect at the point P.
Find, **algebraically**, the coordinates of P.

9. Each day, Marissa drives 40 kilometres to work.

   (a) On Monday, she drives at a speed of x kilometres per hour. (1)
   Find the time taken, in terms of x, for her journey.

   (b) On Tuesday, she drives 5 kilometres per hour **faster**. (1)
   Find the time taken, in terms of x, for this journey.

   (c) Hence find an expression, in terms of x, for the difference in times of the two journeys. (3)
   Give this expression **in its simplest form**.

10. (a) Evaluate $(2^3)^2$. (1)

    (b) Hence find n, when (1)

$$(2^3)^n = \tfrac{1}{64}.$$

11. The sum of consecutive even numbers can be calculated using the following number pattern:

$$2 + 4 + 6 = 3 \times 4 = 12$$
$$2 + 4 + 6 + 8 = 4 \times 5 = 20$$
$$2 + 4 + 6 + 8 + 10 = 5 \times 6 = 30.$$

    (a) Calculate (1)

$$2 + 4 + \ldots + 20.$$

    (b) Write down an expression for (1)

$$2 + 4 + \ldots + n.$$

(c) Hence, or otherwise, calculate (2)

$$10 + 12 + \ldots + 100.$$