Section A
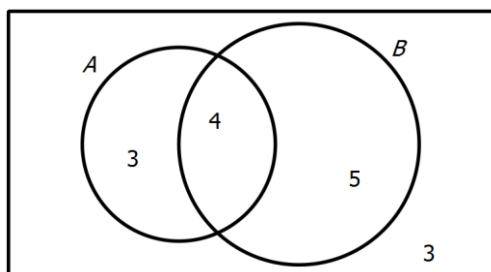
Shade the correct option on the answer booklet provided.

1. If $a * b = a + b - 2ab$ for all a and b, then $7 * (-2)$ is equal to

(A) 19

(B) 33

(C) -23

(D) 9

2. From the Venn diagram P (A|B) is:

(A) $\frac{5}{12}$

(B) $\frac{4}{5}$

(C) $\frac{4}{7}$

(D) $\frac{4}{9}$

3. A bag of 5 marbles contains 2 green ones. Two marbles are selected with replacement. The probability of selecting two green marbles is

(A) $\frac{9}{20}$

(B) $\frac{2}{25}$

(C) $\frac{1}{10}$

(D) $\frac{4}{25}$

4. A quadratic graph $y = ax^2 + bx + c$ has two x –intercepts. This tells us that

(A) The graph has a maximum turning point

(B) There is no y-intercept

(C) $b^2 - 4ac > 0$

(D) $\frac{-b}{2a} < 0$

5. A circle of radius 5cm has a chord 4cm from the centre of the circle. The length of the chord is

(A)   4.5 cm

(B)   6 cm

(C)   3 cm

(D)   8 cm

6. Find the smallest angle in the triangle with side lengths 8cm, 13cm and 19cm to the nearest degree.

(A) 19°

(B) 33°

(C) 52°

(D) 24°

7. The graphs $y = 3^x \ and \ y = \frac{1}{3}$ intersect at the point:
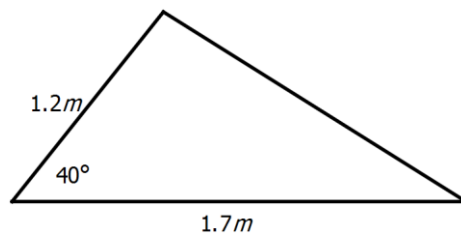
(A)   (1,3)

(B) $(-1, \frac{1}{3})$

(C)   (-1, 3)

(D) $(1, \frac{1}{3})$

END OF SECTION A

SECTION B

Question 8 (7 marks)

a) Find the remainder when $P(x) = x^4 - x^3 + 3x^2$ is divided by $(x + 1)$ 1

b) If $P(x) = x^3 - 4x^2 + mx - 2$ and P(-2) = 0 , find the value of m.   2

c) $P(x) = 2x^3 + x^2 - 5x - 1$ and $A(x) = (x^2 + 3)$. Express the result of $P(x) \div A(x)$
   in the form of $P(x) = A(x) \times Q(x) + R$ where R is a function of x.   2

d) Find the area of the triangle below correct to two decimal places.   2

Question 9 (7 marks)

a) A card is selected from a standard deck of 52 playing cards.
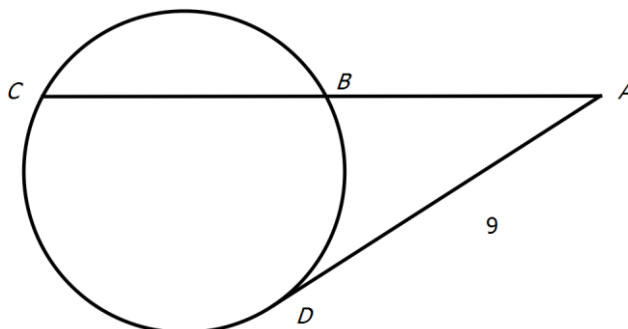   ***Event A - " the card is a red heart"***
     Event B - " the card is a king"
   Find

     (i) n(A∩ B)   1
     (ii) P (Ã)   1
     (iii) P(A ∩ B)   1

b) Express 0.323232…….. as a series.
   Hence find a simple fraction that is equivalent to 0.323232………..   2

c) AD is a tangent to the circle. BC = x and AB = 7. Find the value of x.
   (No reasons required)   2

Question 10 (8 marks)

a) The distance between the points (-2, -1) and (a, 3) is $\sqrt{20}$. Find the value(s) of a.　　　2

b) What is the equation of the perpendicular bisector of the line segment, that joins A(1,1) with B(3,5)?　　　3

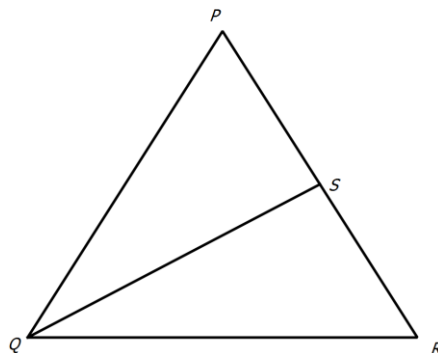c) C(-1,2) is the centre of a circle which touches the line $3x + 4y - 10 = 0$.

Find

    (i)   the radius　　　2
    (ii)   the equation of the circle.　　　1

Question 11 (10 marks)

a) Solve for θ where $0 \le \theta \le 360^o$: $2 \sin^2\theta = 1$　　　3

b) Find the exact value of x.　　　2
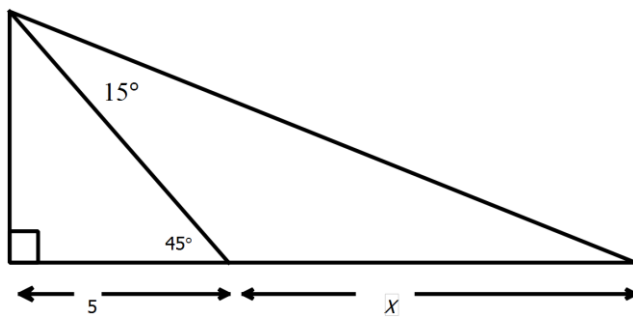
c) In ΔPQR, PQ= PR = 3, $\angle PRQ = 72^o$ and QS bisects $\angle PQR$ meeting PR at S.
　Copy the diagram into your answer booklet and show the information given.

    (i) Find the value of $\angle SQR$.　　　1

    (ii) Prove that $\Delta QSR \parallel\!\parallel \Delta PQR$.　　　2

    (iii) If QR = x, show that $x^2 + 3x - 9 = 0$　　　2

Question 12 (9 marks)

a) Sketch a neat graph of $y = (2 - x)(x + 1)^2$ showing all important features.   3

b) Two similar polygons have areas of 49cm² and 121cm².

    (i) What is the ratio of their sides?   1

    (ii) If side of the smaller polygon is 2cm, what is the length of the matching side of the larger polygon?   1

c) A light aircraft on a joy flight over Kakadu National Park travels due east for 125km then on a bearing of 215°T. Then it returns to its starting point by travelling on a bearing 337°T.

    (i) Draw a neat diagram to represent the above information.   2

    (ii) Find the distance travelled in the third leg of the journey correct to the nearest km.   2

Question 13 (11 marks)

a) The lengths of the rungs of a ladder increase uniformly. The top rung is 40cm and the bottom rung is 75cm. If 13.8m of wood is used to make the rungs, how many rungs are there?   2


Bottom   Top

Not to scale
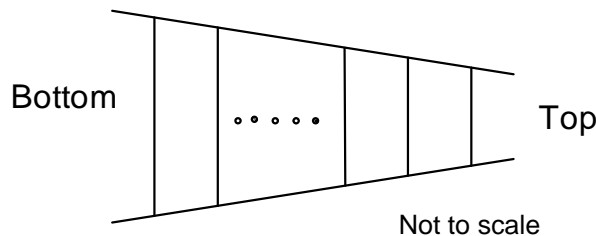
b) Ray travels from town A to town B, a distance of 300km. On his return journey, due to rain and fog, his speed is reduced by 15km/h and hence his journey required an extra 1hour and 40 minutes.
Find his average speed for travelling from town A to town B.   2

c) A function f is defined as $f(x) = \frac{2}{3-x}$

    (i) State the domain and range of function f.   2

    (ii) Find $f^{-1}(x)$.   2

**Question 13 continued over the page**

d)
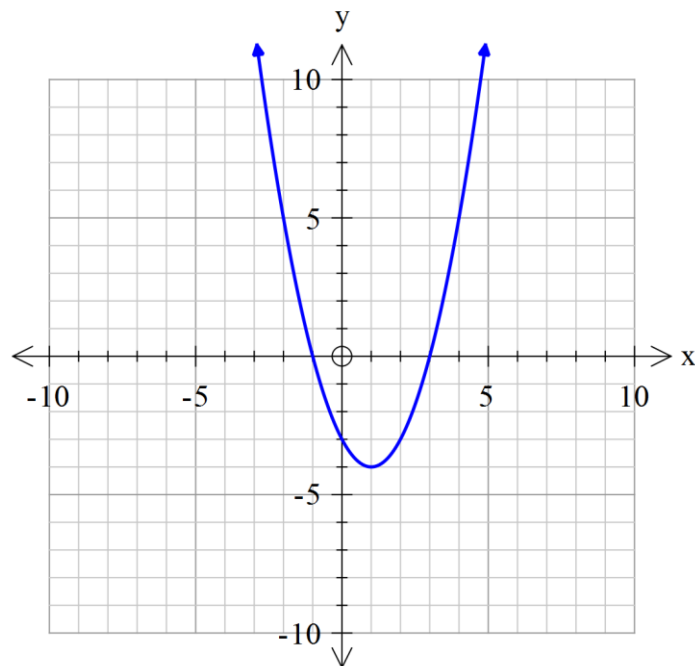
If $y = a(x + b)^2 + c$ represents the above parabola, find the values of a, b and c. 3

Question 14 (12 marks)

a) Tom starts working for a business at the beginning of 1995. He wants to retire at the end of 2024. He invests $1000 in a superannuation scheme at the beginning of each year at 9.5% per annum.

i)   What is the value of his first investment at the end of 2024? 2
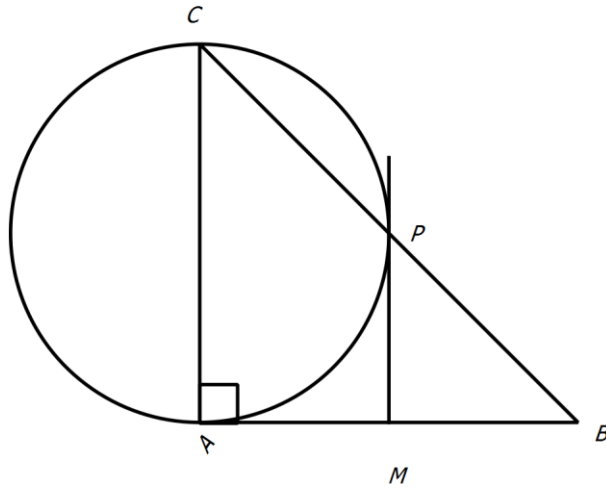ii)   Find the amount of superannuation at maturity. 2

b) Using the ΔABC, prove that $\sin^2\theta + \cos^2\theta = 1$ 3
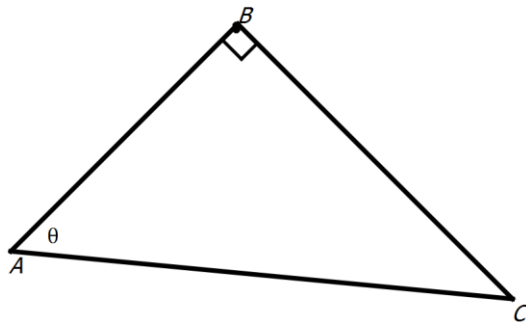
c) $\triangle ABC$ is right angled. AC is a diameter and PM is a tangent at P, where P is the point at which the circle intersects the hypotenuse.

Copy the diagram into your answer booklet.

(i)	Explain why, $\angle APM = \angle ACP$.	1
(ii)	Prove that PM = MB.	2
(iii)	Hence show that AM = MB.	2

End of Examination