Section A

Answer **all** questions in this section

[40 marks]

1. Solve the simultaneous equations $\frac{x}{5} = \frac{59}{40} - \frac{y}{8}$ and $x + y = 10$ [4 marks]

2. a) By using the competing the square method, find the turning point for $g(x) = 2x^2 + 5x - 3$ [4 marks]

   b) Sketch the function $g(x) = 2x^2 + 5x - 3$ for the domain $-4 \le x \le 2$. Hence, find the range of $g(x)$ corresponding to the given domain. [4 marks]

3. S_n and T_n denote the sum for the first n-th term of a sequence respectively. Given that $S_n = pn^2 + (6 - p)n$, where p is a constant.

   a) Express the fourth term of the progression in terms of p. [2 marks]

   b) If $T_4 = 18$,

      i) find the value of p

      ii) calculate the value of $T_{11} + T_{12} + T_{13} + T_{14} + \ldots + T_{20}$,

      iii) prove that the sequence is an arithmetic progression. [6 marks]

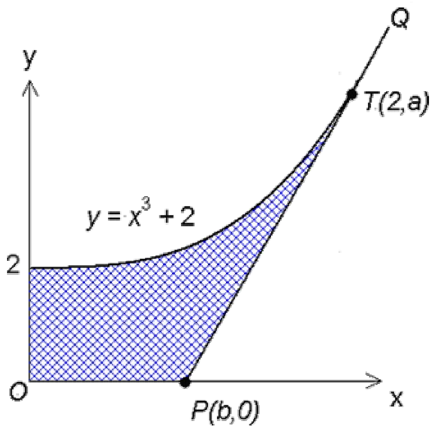
4. 

Diagram 1

Diagram 1 shows that PQ is a tangent to the curve $y = x^3 + 2$. Find

   a) the values of a and b, [3 marks]

   b) the area of the shaded region [3 marks]

5. ***Diagram 2*** shows, that P (3, 1), Q (6, 3) and R (4, 7) are the mid-points of the sides of triangle ABC. Find

   a) the gradient of PQ, [1 mark]

   b) the equation of AC, [3 marks]

   c) the equation of the perpendicular bisector of the line AC, [3 marks]

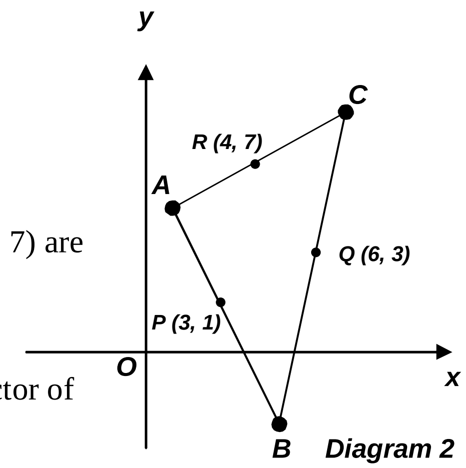


Diagram 2

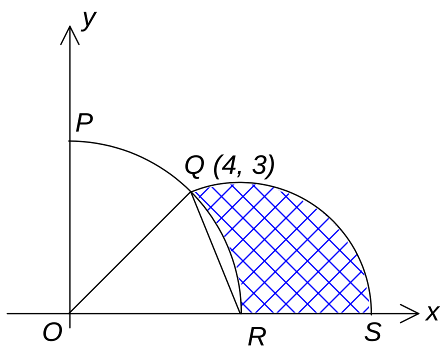
6. 

Diagram 3

Diagram 3 shows that $OPQR$ is a quadrant with centre O and Q is the point (4, 3). QRS is a sector of a circle with centre R.

   a) Calculate $\angle QOS$ in *radian* [1 mark]

   b) Find the straight length of QR [1 mark]

   c) Calculate the area of the shaded region. [5 marks]

Section B

Answer **four** questions from this section

[40 marks]

7. *Use graph paper to answer this question.*
Table 1 shows the values of two variables x and y. It is known that x and y are related by the given formula $y = ax^2 + bx$, where a and b are constants.

x	1	2	3	4	5	6
y	4.2	10.8	19.9	31.0	45.1	61.2

Table 1

a) Plot $\frac{y}{x}$ against x using the scale of 2 *cm* to 1 *unit* on both axes.
Hence, draw the line of best fit, [4 marks]

b) From the graph,
   i) estimate the value of a and of b
   ii) find the value of y when $x = 3.2$ [6 marks]

8. *Table 2* shows a frequency distribution for 60 students taking the *International New South Wales Pastry Examination.*

Scores %	*Frequency*
41 – 45	3
46 – 50	8
51 – 55	7
56 – 60	***k***
61 – 65	12
66 – 70	8
71 – 75	7

Table 2

a) Find the value of k [1 mark]

b) Without using *ogive*, find
   i) the median score
   ii) the inter-quartile range [5 marks]

c) Determine the standard deviation for the data *table 2*. [4 marks]

9. a) Find the coordinates of the turning points of the curve $y = (2x-3)(x^2-6)$ and determine whether each is a maximum or a minimum. [3 marks]

b) A cylindrical container, open at one end, has height h *cm* and base radius r *cm*.
   i) Write down, in terms of h and r, expressions for
      a) the total surface area of the container, $S\ cm^2$
      b) the volume of the container, $V\ cm^3$ [2 marks]
   ii) Given that S has the value 3π, show that
      $V = \frac{1}{2}\pi r(3 - r^2)$ [2 marks]
   iii) Hence, find the value of r and the corresponding value of h which make V a maximum. [3 marks]

10. a) A straight line $y = 4 - x$ intersects a curve $y = (x-2)^2$ at two points M and N.
Determine the distance of MN. [6 marks]

b) If S is the mid-point of MN, find the gradient of OS, where O is the origin. [4 marks]

11. a) Find the range of values of m such that the equation $(2-3m)x^2 + (4-m)x + 2 = 0$ does not have real roots [3 marks]

b) The equation $2x^2 + 3x + q = 0$ has two real and equal roots. Find the value of q. [3 marks]

c) With the value of q obtained in 11(b), determine the stationary value of the curve, $2x^2 + 3x + q = 0$ and its corresponding value of x using the *completing the square* method. [4 marks]

Section C

Answer **two** questions from this section

[**20 marks**]

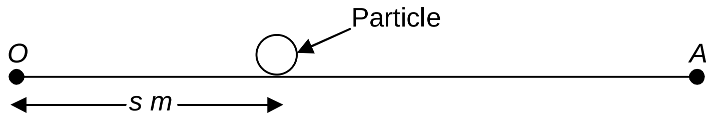
12. 

Diagram 4

Diagram 4 shows a particle moving along a straight line. Its distance, *s* meter from a fixed point *O*, on the straight line is given as $s = 2t^2 - 4t + 10$, where *t* is the time taken in seconds after passing the the point *A*. Find

a) the distance of *OA*, [1 mark]

b) the distance of the particle from *A* when the particle is instantaneously at rest. [2 marks]

c) the velocity of the particle when it comes back to point *A*. [2 marks]

d) the average velocity of the particle in the first 6 seconds. [5 marks]

13. ***Diagram 5*** shows a quadrilateral *ABCD*, where $\sin\angle ADC = \frac{\sqrt{3}}{2}$ and $\angle ACB$ is obtuse. Calculate

a) the length of *AC*, [3 marks]

b) $\angle ABC$ [2 marks]

c) the perpendicular distance from *C* to the side *AB*. [5 marks]

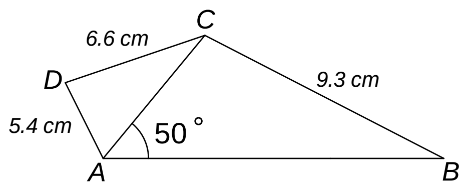


Diagram 5

14. A factory produces not more than 300 computer desktop tables and not more than 150 cupboards for servers a week. The factory must make a profit of more than RM 4 000 in a week for it to continue in operation. Each computer desktop table sold makes a profit of RM 10 while the cupboard makes a profit of RM 20 each. Given that the factory manufactured *x* number of tables and *y* number of cupboards each week.

a) Deduce three inequalities other than $x \geq 0$ and $y \geq 0$, that fulfils the above conditions. [3 marks]

b) By using a scale of 2 *cm* to 50 *units* for both axis, Shade the region, ***R*** defined by the inequalities. [5 marks]

c) Find the maximum profit obtainable by the factory. [2 marks]

15. ***Table 3*** shows three items *P*, *Q* and *R* in the year 1997 and 1999 and its respective weightages.

Types of Item	Price (RM) in 1997	Price (RM) in 1999	Weightage (%)
P	60.00	75.00	2*x*
Q	40.00	45.00	4*x*
R	80.00	120	*y*

Table 3

a) By using 1997 as the base year, calculate the price index of each item *P*, *Q* and *R*. [6 marks]

b) Given that the composite index of the all the items combined was 140 in 1999 based on 1997, find the value of *x* and of *y*. [4 marks]

END OF QUESTIONS