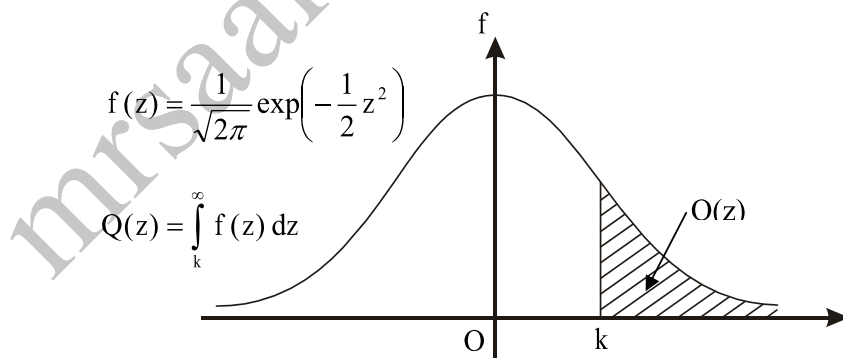


Module 2-KERTAS 2

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THE UPPER TAIL PROBABILITY Q(z) FOR THE NORMAL DISTRIBUTION N(0, 1)
 KEBARANGKALIAN HUJUNG ATAS Q(z) BAGI TABURAN NORMAL N(0, 1)

z										Minus / Tolak									
	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641	4	8	12	16	20	24	28	32	36
0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247	4	8	12	16	20	24	28	32	36
0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859	4	8	12	15	19	23	27	31	35
0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483	4	7	11	15	19	22	26	30	34
0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121	4	7	11	15	18	22	25	29	32
0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776	3	7	10	14	17	20	24	27	31
0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451	3	7	10	13	16	19	23	26	29
0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148	3	6	9	12	15	18	21	24	27
0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867	3	5	8	11	14	16	19	22	25
0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611	3	5	8	10	13	15	18	20	23
1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379	2	5	7	9	12	14	16	19	21
1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170	2	4	6	8	10	12	14	16	18
1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985	2	4	6	7	9	11	13	15	17
1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823	2	3	5	6	8	10	11	13	14
1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0721	0.0708	0.0694	0.0681	1	3	4	6	7	8	10	11	13
1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559	1	2	4	5	6	7	8	10	11
1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0.0475	0.0465	0.0455	1	2	3	4	5	6	7	8	9
1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367	1	2	3	4	4	5	6	7	8
1.8	0.0359	0.0351	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294	1	1	2	3	4	4	5	6	6
1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233	1	1	2	2	3	4	4	5	5
2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183	0	1	1	2	2	3	3	4	4
2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143	0	1	1	2	2	2	3	3	4
2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110	0	1	1	1	2	2	2	3	3
2.3	0.0107	0.0104	0.0102								0	1	1	1	1	2	2	2	2
				0.00990	0.00964	0.00939	0.00914				3	5	8	10	13	15	18	20	23
								0.00889	0.00866	0.00842	2	5	7	9	12	14	16	16	21
2.4	0.00820	0.00798	0.00776	0.00755	0.00734						2	4	6	8	11	13	15	17	19
						0.00714	0.00695	0.00676	0.00657	0.00639	2	4	6	7	9	11	13	15	17
2.5	0.00621	0.00604	0.00587	0.00570	0.00554	0.00539	0.00523	0.00508	0.00494	0.00480	2	3	5	6	8	9	11	12	14
2.6	0.00466	0.00453	0.00440	0.00427	0.00415	0.00402	0.00391	0.00379	0.00368	0.00357	1	2	3	5	6	7	9	9	10
2.7	0.00347	0.00336	0.00326	0.00317	0.00307	0.00298	0.00289	0.00280	0.00272	0.00264	1	2	3	4	5	6	7	8	9
2.8	0.00256	0.00248	0.00240	0.00233	0.00226	0.00219	0.00212	0.00205	0.00199	0.00193	1	1	2	3	4	4	5	6	6
2.9	0.00187	0.00181	0.00175	0.00169	0.00164	0.00159	0.00154	0.00149	0.00144	0.00139	0	1	1	2	2	3	3	4	4
3.0	0.00135	0.00131	0.00126	0.00122	0.00118	0.00114	0.00111	0.00107	0.00104	0.00100	0	1	1	2	2	2	3	3	4



Example / Contoh:
 If $X \sim N(0, 1)$, then
 Jika $X \sim N(0, 1)$, maka
 $P(X > k) = Q(k)$
 $P(X > 2.1) = Q(2.1) = 0.0179$

SECTION A

[40 marks]
[40 markah]

Answer all questions in this section .

1. Solve the equations $x^2 - y + y^2 = 2x + 2y = 10$.

[5 marks]

[Answer $x = 2, y = 3; x = \frac{5}{2}, y = \frac{5}{2}$]

2 Given $kx^2 - x$ is the gradient function for a curve such that k is a constant. $y - 5x + 7 = 0$ is the equation of tangent at the point $(1, -2)$ to the curve.

Find,

- (a) the value of k ,
(b) the equation of the curve.

[2 marks]

[3 marks]

[Answer $k = 6$]

[$y = 2x^3 - \frac{x^2}{2} - \frac{7}{2}$]

3



Diagram 3

Diagram 3 shows a string of length 125π cm is cut and made into ten circles as shown above . The diameter of each subsequent circles are different by 1 cm from its previous.

Calculate,

- (i) the diameter of the smallest circle ,
(ii) the number of a circle if the length of a circle is 400

[6 marks]

Answer : (b)(i) 8 (ii) 21

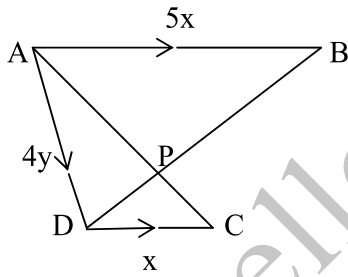
4 Table 2 shows the frequency distribution of the marks of a group of form 4 students in a test.

Mark	Number of students
20 – 29	2
30 – 39	10
40 – 49	36
50 – 59	55
60 – 69	k
70 - 79	5

- (a) It is given that the first quartile score is 44.5. Find the value of k. [3 marks]
- (b) [Use the graph paper to answer this question]
Using the scale of 2 cm to 10 marks on the horizontal axis and 2 cm to 10 students on the vertical axis, draw a histogram based on the given data. Hence, estimate the mode mark [3marks]
- (c) Calculate the mean marks. [2 marks]
[Answer k = 12, mode = 52.25 mean = 55.81]

- 5 a) Prove that $\frac{1}{\sec \theta} - \sec \theta = -\sin \theta \tan \theta$ [3 marks]
- (b) Sketch $y = 1 - |\sin 2x|$ for $0 \leq x \leq \pi$. Hence using the same axes, draw a suitable straight line to find the number of solutions of the equation $\pi|\sin 2x| - x = 0$. State the number of solutions [line $y = \frac{-x}{\pi} + 1$], 4 number of solution [5 marks]

6



In the diagram above, $\vec{AB} = 5x$, $\vec{AD} = 4y$ and $\vec{DC} = x$.

- (i) Express,
 (a) \vec{AC}
 (b) \vec{BD} in terms of x and y. [2 marks]
- (ii) Given $\vec{AP} = h \vec{AC}$ and $\vec{BP} = k \vec{BD}$.
 State \vec{AP}
 (a) in terms of h, x and y,
 (b) in terms of k, x and y.
 Hence, or otherwise, prove that $h = k$. [5 marks]

Answer (i)(a) $4y + x$, (b) $-5x + 4y$ (ii)(a) $h(4y + x)$ (b) $((5 - 5k)x + 4ky; k = \frac{5}{6}$

SECTION B

[40 Marks]

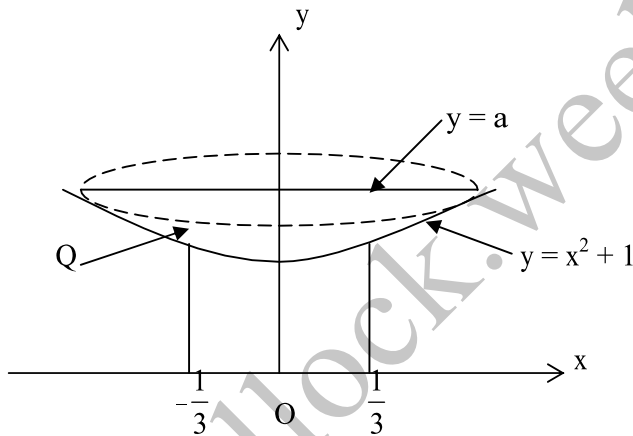
Answer four equations from this section.

- 7 Table 7 shows the values of two variables x and y , obtained from an experiment. Variable x and y are related by the equations $y = ab^{-x}$, where a and b are constants. One of the value of y is wrongly recorded.

x	1	2	3	4	5
y	41.7	38.7	28.9	27.5	20.1

- (a) Plot $\log_{10} y$ against x .
 (b) By using your graph find,
 (i) the value of y which is wrongly recorded and determine the correct value
 (ii) the value of a and the value of b
 (iii) the value of y when $x = 2.5$.

8



- (a) Refer to the diagram above, answer the following question:
 (i) Calculate the area of the shaded region.
 (ii) Q is a solid obtained when the region bounded by the curve $y = x^2 + 1$ and the line $y = a$ is revolved through 180° at the y -axis. If the volume of Q is $\frac{1}{2} \pi \text{ unit}^2$ Find the value a .

[6 marks]

- (b) Find the equation of tangent to the curve $y = 2x^2 + r$ at point $x = k$. If the tangent passes through the point $(2, 0)$, find r in terms of k .

[4 marks]

[Answer 16. (a)(i) $\frac{56}{81}$ (ii) $a = 2$ (b) $y - (2k^2 + r) = 4k(x - k)$; $r = 2k^2 - 8k$]

Solutions to this question by scale drawing will not be accepted.

9.

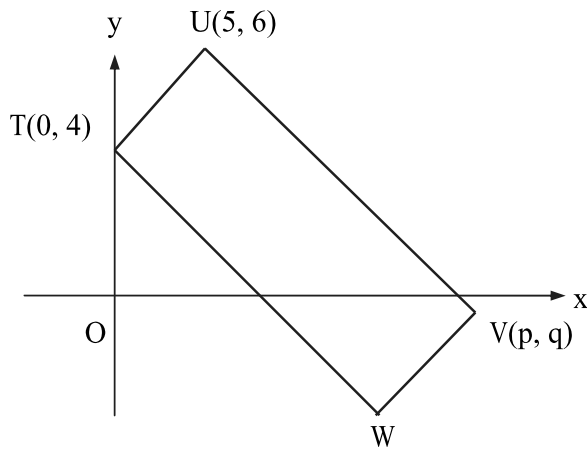


Diagram above shows the vertices of a rectangle TUVW in a Cartesian plane.

- (a) Find the equation which relates p and q by using the gradient of UV. [3marks]
- (b) Shows that the area of the Δ TUV can be expressed as $p - \frac{5}{2}q + 10$. [2marks]
- (c) Hence, calculate the coordinates of V given the area of the rectangle TUVW is 5 unit². [3marks]
- (d) Find the equation of the straight line TW in the intercept form. [2marks]

10

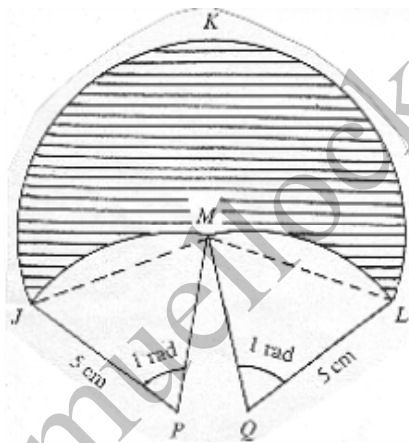


Diagram above shows a sector MJKL of a circle centre M and two sectors, PJM and QML, with centre P and Q respectively. Given the angle of the major sector JML is 3.6 radian.

Find,

- (a) the radius of the sector MJKL, [2 marks]
- (b) perimeter of the shaded region, [2 marks]
- (c) the area of sector PJM, [2 marks]
- (d) the area of the shaded region. [4 marks]

[Answer 11. (a) 4.795 (b) 27.24 (c) $\frac{25}{2}$]

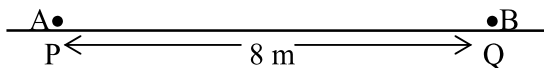
- 11 (a) In a centre of chicken eggs incubation, 30% of the eggs hatched are male chickens. If 10 newly born chickens are chosen at random, find the probability (correct to four decimal places) that
- (i) 4 eggs hatched are male chicken,
 - (ii) at least 9 eggs hatched are female chickens.
- [4 marks]

- (b) The mass of guava fruits produced in a farm shows a normal distribution with mean 420 g and standard deviation 12 g. Guava fruits with mass between 406 g and 441 g are sold in market, whereas those with mass 406 g or less are sent to the factory to be processed as drinks. Calculate,
- (i) the probability (correct to four decimal places) that a guava fruit chosen randomly from the farm will be sold in the market,
 - (ii) the number of guava fruits that has been sent to the factory and also not sold in the market, if the farm produced 2 500 guava fruits.
- [6 marks]

[Answer (a)(i) 0.2001 (ii) 0.1493 (b)(i) 0.8383 (ii) 100]

Sections C
Answer two questions from this section.

12 .



In the diagram above, P and Q are two fixed points on a straight line such that $PQ = 8$ m. At a certain instant, particle A passes the point P with a velocity $V_A = 2t - 6$, whereas particle B passes the point Q with a velocity $V_B = 5 - t$ where t is time in second after the particle A and the particle B have passed the point P and the point Q.
[Assume direction P to Q is the positive.]

- (a) Find the distance between the particle A and particle B at the instant when particle A stopped momentarily. [3marks]
- (d) Find the time, t_1 , when the distance between the particle A and particle B is maximum before the two particles meet.. [2 marks]
- (c) For how long the two particles A and B are moving in the same direction?
- (d)(i) Find the time, t_2 , when the particles A and B meets.
- (ii) Hence, find the distance from the point P when the two particles meet.. [3 marks]

[Answer (a) $27\frac{1}{2}$ m (b) $\frac{11}{3}$ s (c) 2 s (d)(i) 8 s (ii) 16 m]

- 13 A small factory produces a certain goods of A model and B model. In a day, the factory produces x units of A model and y units of B model where $x \geq 0$ and $y \geq 0$. Time taken to produce one unit A model and one unit B model is 5 minutes and minutes respectively. The production of these goods in a certain day is

restricted by the following conditions:

- I. The number of units of A model is not more than 60,
- II. The number of units of B model is more than two times the number of units of A model by 10 units or less.
- III. The total time for the production of A model and B model is not more than 400 minutes.

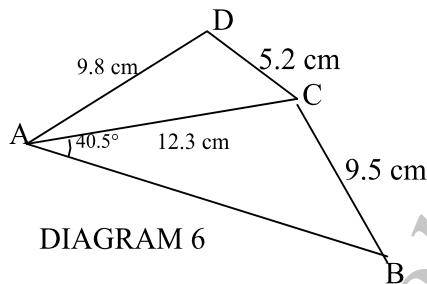
Write an inequality for each of the above conditions. Hence draw the graphs for the three inequalities. Mark and shade the region R which satisfies the above conditions.

Use your graph to answer the following questions:

- (a) Find the range of the number of units of A model which can be produced if 40 units of B model are produced.
- (b) Find the total maximum profits which can be obtained if the profit gained from one unit of A model and one unit of B model is RM 6 and RM 3 respectively.
- (c) If the factory intends to produce the same number of units of A model and B model, find the maximum number of units which can be produced for each of A model and B model.

Answer $x \leq 60$, $y - 2x \leq 10$, $5x + 4y \leq 400$ (a) $15 \leq x \leq 48$ (b) RM435 (c) 44

14. Diagram 6 shows a quadrilateral ABCD such that $\angle ABC$ is acute.



- (a) Calculate,
 - (i) $\angle ABC$,
 - (ii) $\angle ADC$,
 - (iii) area, in cm^2 , of quadrilateral ABCD.
- (b) A triangle $A'B'C'$ has the same measurements as those given for triangle ABC, that is, $A'C' = 12.3 \text{ cm}$, $C'B' = 9.5 \text{ cm}$ and $\angle B'A'C' = 40.5^\circ$, but which is different in shape to triangle ABC.
 - (i) Sketch the triangle $A'B'C'$.
 - (ii) State the size of $\angle A'B'C'$.

[8 marks]

[2 marks]

Answer . (a)(i) $57.21^\circ - 57.25^\circ$ (ii) $106.07^\circ - 106.08^\circ$ (iii) $82.37^\circ - 82.39^\circ$

(b)(i)  (ii) $122.75^\circ - 122.79^\circ$

10. Table 2 shows the price indices and percentage usage of four items, P, Q, R, and S, which are the main ingredients of a type biscuits.

Item	Price index for the year 1995 based on the year 1993	Percentage of usage (%)
P	135	40
Q	x	30
R	105	10
S	130	20

- (a) Calculate,
 (i) the price of S in the year 1993 if its price in the year 1995 is RM37.70
 (ii) the price index of P in the year 1995 based on the year 1991 if its price index in the year 1993 based in the year 1991 is 120.

[5 marks]

- (b) The composite index number of the cost of biscuits production for the year 1995 based on the year 1993 is 128.

Calculate,

- (i) the value of x,
 (ii) the price of a box of biscuit in the year 1993 if the corresponding price in the year 1995 is RM 32.

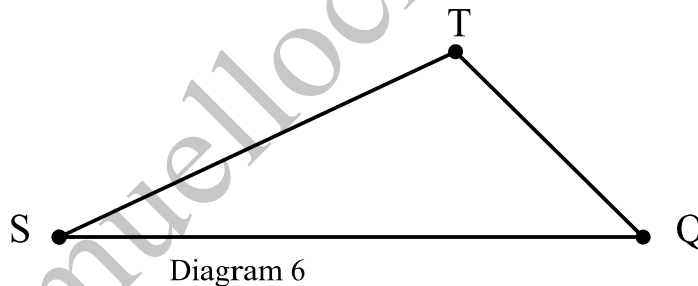
[5 marks]

[Answer (a)(i) RM 29 (ii) 162 (b)(i) 125 (ii) RM 25]

Section C Alternative

Answer two questions from this section.

12. Diagram 6 shows $\triangle STQ$ such that $ST = 12.1$ cm and $TQ = 9.5$ cm.



The area of the triangle is 45 cm^2 and $\angle STQ$ is obtuse.

- (a) Find
 (i) $\angle STQ$ [$\angle STQ = 128.47^\circ$ or $128^\circ 28'$]
 (ii) the length, in cm, of SQ [19.49 cm]
 (iii) the shortest distance, in cm, from T to SQ. [4.613] [5 marks]

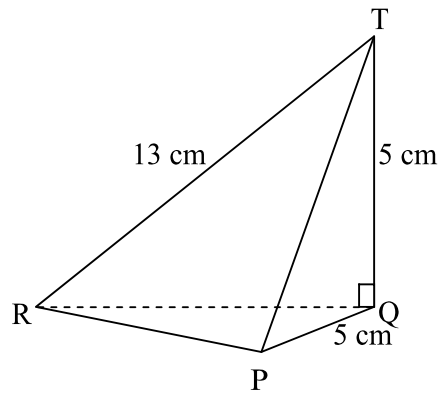


Diagram 7

- (b) Diagram 7 shows a pyramid TPQR with a horizontal triangular base PQR. T is vertically above Q. Given that $PQ = QT = 5$ cm, $TR = 13$ cm and $\angle PRQ = 15^\circ$. Calculate two possible values of $\angle PQR$
 $[\angle PQR = 126.60^\circ$ and $23.40^\circ]$
- (c) Using the acute $\angle PQR$ in (i), calculate
- (i) the length of PR [7.673]
 - (ii) the value of $\angle PTR$ [29.42^\circ]
 - (iii) the surface area of the plane TPR [22.58] [5marks]

13. shows the bar chart for the monthly sales of five essential items sold at a sundry shop. Table 3 shows their price in the year 2000 and 2006, and the corresponding price index for the year 2006 taking 2000 as the base year.

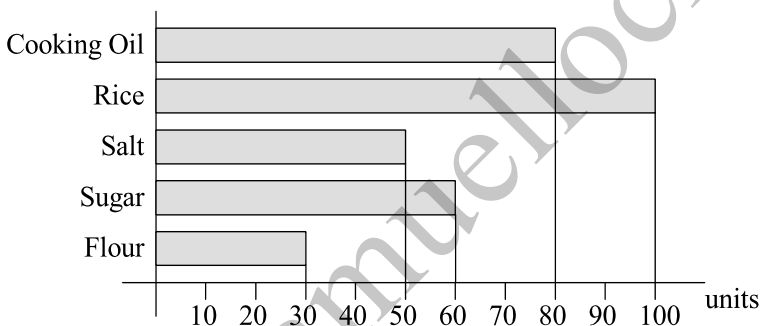


Diagram 2

Items	Price in the year 2000	Price in the year 2006	Price Index for the year 2006 based on the year 2000
Cooking Oil	x	RM2.50	125
Rice	RM1.60	RM2.00	125
Salt	RM0.40	RM0.55	y RM1.20
Sugar	RM0.80	150	
Flour	RM2.00	z	120

TABLE 4

Figure 8 shows the object passes the point O in its motion. t seconds after leaving the point O, the velocity of P, $v \text{ m s}^{-1}$ is given by $v = 3t^2 - 18t + 24$. The object P stops momentarily for the first time at the point B.

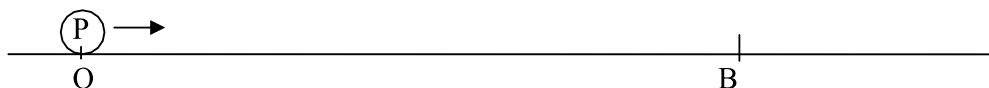


Figure 8

(Assume right-is-positive)

Find:

- (a) the velocity of P when its acceleration is 12 ms^{-2} , [9 ms^{-1}] [3 marks]
 (b) the distance OB in meters, [20 m] [4 marks]
 (c) the total distance travelled during the first 5 seconds. [28 m] [3 marks]

12.

(a) (i) Use area formula

$$\frac{1}{2}(12.1)(9.5) \sin STQ = 45$$

$\angle STQ = 128.47^\circ$ or $128^\circ 28'$
 (ii) Using cosine Rule

$$SQ^2 = 12.1^2 + 9.5^2 - 2(12.1)(9.5) \cos STQ$$

$$SQ = 19.49 \text{ cm}$$

$$\angle TQS = 29.05^\circ$$

(iii) $\sin 29.05 = \frac{h}{9.5}$ or equivalent

$$= 4.613 \text{ cm}$$

(b)

$$\frac{5}{\sin 15^\circ} = \frac{12}{\sin p}$$

$$\sin p = \frac{12}{5} \times \sin 15^\circ = 0.6212$$

$$\angle QPR = 38^\circ 24', 141^\circ 36' @ 38.40^\circ, 141.60^\circ$$

$$\angle PQR = 180^\circ - 15^\circ - 38.40^\circ @$$

$$\angle PQR = 180^\circ - 15^\circ - 141.60^\circ$$

$$\angle PQR = 126.60^\circ \text{ and } 23.40^\circ$$

(c) (i)
$$\frac{PR}{\sin 23.4^\circ} = \frac{5}{\sin 15^\circ}$$

$$PR = \frac{5}{\sin 15^\circ} \times \sin 23.4^\circ$$

$$= 7.672 \text{ cm}$$

$$PR = 7.673 \text{ cm}$$

(ii) Use Cosine Rule

$$\cos \angle PTR = \frac{13^2 + (\sqrt{50})^2 - (7.672)^2}{2(13)(\sqrt{50})} = 0.8710$$

$$\angle PTR = 29.42^\circ$$

$$(iii) \text{ Area } \Delta PVR = \frac{1}{2}(13)(\sqrt{50}) \sin 29.42^\circ = 22.58 \text{ cm}^2$$

13.

- (a) (i) $x = 2.00$
(ii) $y = 137.5$
(iii) $z = 2.40$

(b) Use composite index formula

$$\bar{I} = \frac{125(80) + 125(100) + 137.5(50) + 150(60) + 120(30)}{80 + 100 + 50 + 60 + 30} \\ = 131.17$$

$$(c) \frac{P_{2006}}{150} \times 100 = 131.17$$

$$P_{2006} = \text{RM}196.76$$

$$I_{2006}^{2008} = 120$$

$$(d) I_{2000}^{2008} = \frac{120 \times 131.17}{100} \\ = 157.40$$

14. (a) The three inequalities are

$$x + y \leq 75, \quad x \leq 2y \quad \text{and} \quad 9x + 2y \geq 200$$

(b)

refer by graph

(c) (i) $16 \leq \text{number of A type souvenirs sold} \leq 45$

(ii) Maximum profit

$$= \text{RM} [9(50) + 2(25)]$$

$$= \text{RM}500.$$

