WR 2003

QUESTION 6 (12 MARKS) Use a SEPARATE Sheet of Paper **Marks**

(a) The probability that Rusty will beat Danielle in a set of tennis is 0.6.
On a particular day they play three sets of tennis.

(i) What is the probability that Rusty will win all three sets? **1**

(ii) Draw a probability tree diagram to illustrate the possible results of the three sets. **2**

(iii) What is the probability that Danielle will win exactly two sets? **1**

(iv) What is the probability that Danielle will win at least one set? **1**

(b) Find the exact value of $f'(3)$ if $f(x) = \log_{10}(x^2 - 1)$. **3**

(c) A particle moves in a straight line so that its acceleration $a\,(\text{ms}^{-2})$ at a time $t\,(\text{s})$ is given by $a = \frac{1}{2} + \cos t$. It is initially at rest, 1 m to the left of the origin.

(i) Find it's velocity (as an exact value) when $t = \frac{\pi}{3}$. **2**

(ii) Find the displacement (as an exact value) when $t = \frac{\pi}{3}$. **2**

WR2004

Question 6 (12 Marks) Use a Separate Sheet of paper **Marks**

(a) Find the area bounded by the curve $y = x^3 + 1$, the y-axis and the line $y = 5$ **4**

(b) James received 30 tonnes of topsoil for his yard. He uses a wheel barrow which can hold 150kg to spread the soil.

i. How many loads in the wheelbarrow will he need? **1**

He begins at the pile of topsoil and deposits the first load 3 metres from the pile. Each successive load is dumped half a metre further from the pile.

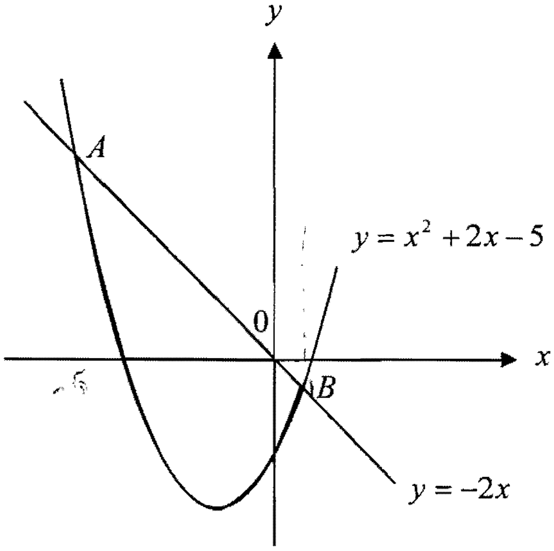
ii. How far from the pile will he leave the final barrow load? **2**

iii. What is the total distance that James will travel with the wheelbarrow if he finishes back at his starting point? **2**

(c) The distance that a particle is from a starting point at time t seconds is given by $s = t^3 - 3t^2 + 5t - 1$. Show that the velocity of the particle **3** is never less than 2m/s.

Trialmath 2005
Question 6 (12 marks) **Marks**

(a)

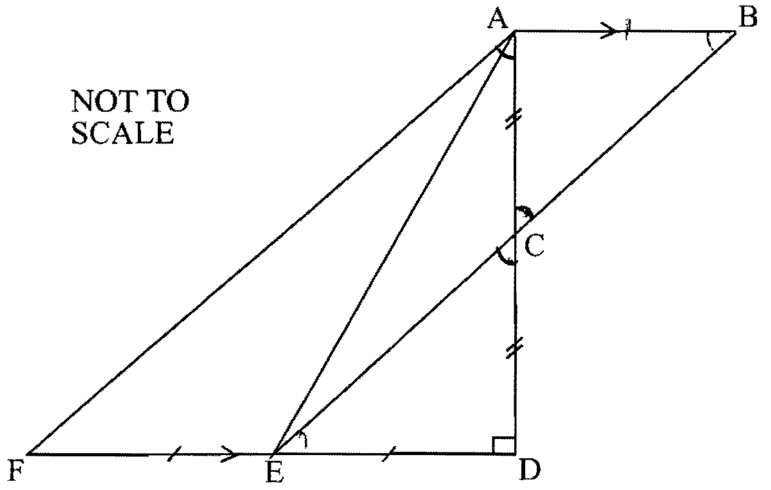


NOT TO SCALE

The diagram shows the graphs of $y = x^2 + 2x - 5$ and $y = -2x$. These two graphs intersect at point A and point B.

(i) Find the x values of the points of intersection A and B. **2**

(ii) Calculate the area of the shaded region. **3**



In the diagram $AB \parallel FD$, ADF is a right-angled triangle, C is the midpoint of AD and E is the midpoint of FD.

(i) Explain why $\angle CED = \angle ABC$.

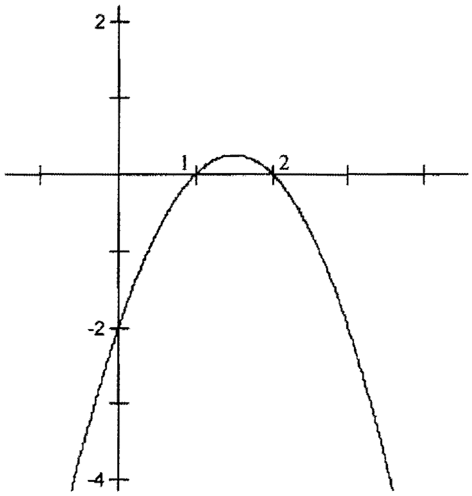
(ii) Show that $\Delta CDE \equiv \Delta CAB$.

(iii) Show that $AF = 2BC$.

(iv) Show that $\angle ACB = \angle DAF$.

WR 2005

Question 6 (12 Marks) Use a Separate Sheet of paper **Marks**



(a) The graph depicts the gradient function $f'(x)$, for the function $y = f(x)$

(i) What x values provide the stationary points of $f(x)$? **1**

(ii) What feature of the graph of $f(x)$ will occur at $x = 1{\cdot}5$? **1**

(iii) If $f(0) = 3$ draw $y = f(x)$ between $x = -1$ and $x = 4$. **2**

iv) Explain why $f(x)$ has only one real root? **1**

(b) Consider the functions $y = 3 - \dfrac{x}{2}$ and $y = \dfrac{1}{2}x^2 - 2x + 1$

(i) Find the points x values of the points where the curves intersect. **2**

(ii) Find the area between the curves. **2**

(c) Michael plays a match made up of 3 sets. In each set Michael has a 0.4 chance of winning that set. Find the probability that Michael will :

(i) Win all three sets. **1**

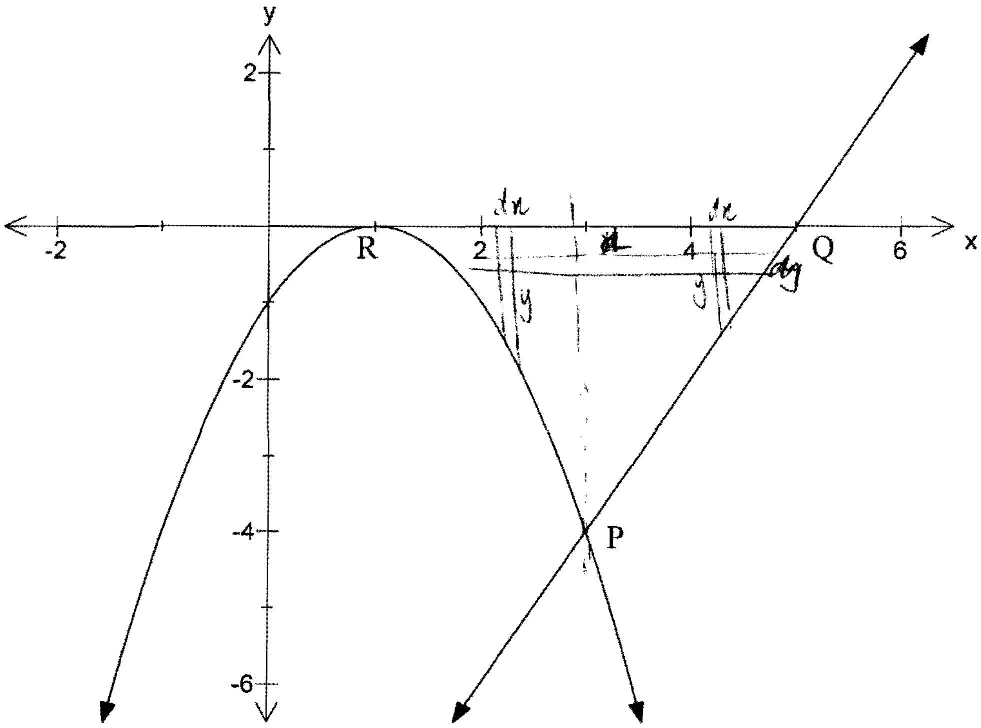
(ii) Not win any sets. **1**

(iii) Win at least one set, but not all three sets **1**

WR 2006

Question 6 (12 Marks) Use a Separate Sheet of paper **Marks**

(a) The diagram shows the curves $y = -(x-1)^2$ and $y = 2x - 10$.
$y = -(x-1)^2$ meets the x axis at R
$y = 2x - 10$ meets the x axis at Q
The curves intersect in the 4[th] Quadrant at P.



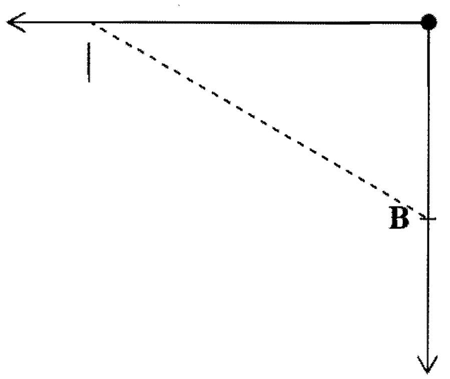
i. Find the coordinates of the point P. **1**

ii. Find the area PQR bounded by the curves $y = -(x-1)^2$, $y = 2x - 10$ and the x–axis. **3**

(b) i Find the sum of the first 200 positive integers. **1**
$1 + 2 + 3 + 4 + \ldots\ldots. 200$

ii. The series $1 + 5 + 7 + 11 + \ldots\ldots\ldots. + 199$ is formed by omitting from the first 200 positive integers all those which are multiples of 2 or 3. **3**

(c)



Two straight roads run from O. One heads due West while the other heads due South.
Person A is 24 km west of O whilst another person, B, is 18 km south of O.
Person A walks at a speed of 2 km/h towards O, whilst person B walks at 4 km/h away from O.

i. Show, that after t hours, the area A km^2 of ΔAOB is given by **2**

$$A = 216 + 30t - 4t^2.$$

ii. Calculate the rate of change in the area of this triangle after 1 hour. **1**

i. When does the triangle stop increasing in area and start to decrease? **1**

WR 2009

Question 6 **(12 Marks)** Use a Separate Sheet of paper **Marks**

(a) A curve has a gradient function with equation $\frac{dy}{dx} = 6(x-1)(x-2)$.

i. If the curve passes through the point (1, 2), what is the equation of the curve? **2**

ii. Find the coordinates of the stationary points and determine their nature. **2**

iii. Find any points of inflexion. **2**

iv. Graph the function showing all the main features. **2**

(b) Show that $\frac{(1+\tan^2\theta)\cot\theta}{\operatorname{cosec}^2\theta} = \tan\theta$ **3**

(c) Evaluate $\lim_{\theta \to 0} \frac{\sin 2\theta}{3\theta}$ **1**

WR 2008

Question 6 (12 marks) Use a SEPARATE writing booklet. **Marks**

a) For the function $y = x^6 - 6x^4$

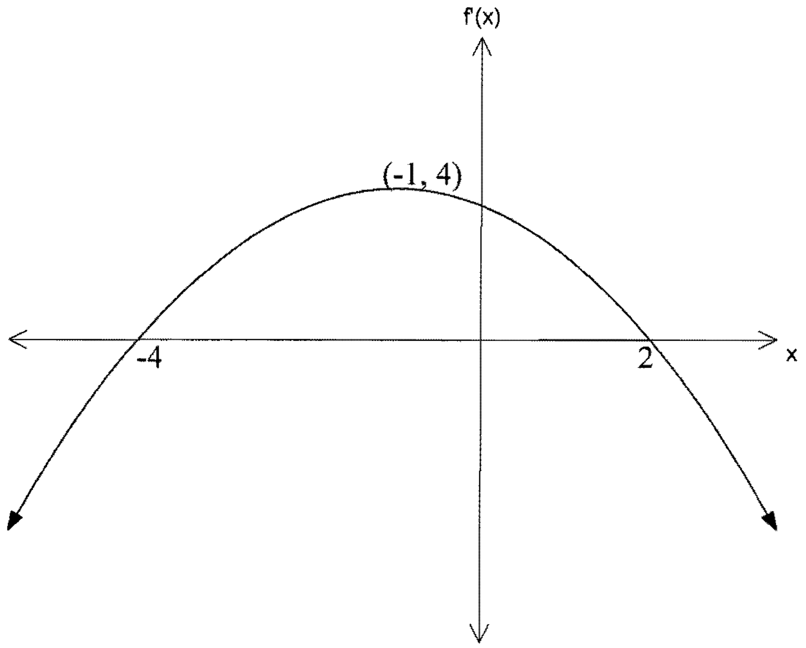
i) Find the x coordinates of the points where the curve crosses the axes. **2**

ii) Find the coordinates of the stationary points and determine their nature. **4**

iii) Find the coordinates of the points of inflexion. **2**

iv) Sketch the graph of $y = x^6 - 6x^4$ indicating clearly the intercepts, stationary points and points of inflexion. **2**

b) For a certain function $y = f(x)$, the sketch of $y = f'(x)$ is shown.



Give the x coordinates of the stationary points on $y = f(x)$ and indicate if they are maxima or minima. **2**

WR 2007

Question 6 (12 marks) Begin a SEPARATE sheet of paper

(a) $\log_m p = 1.75$ and $\log_m q = 2.25$. Find

(i) $\log_m pq$ **1**

(ii) $\log_m \dfrac{q}{p}$ **1**

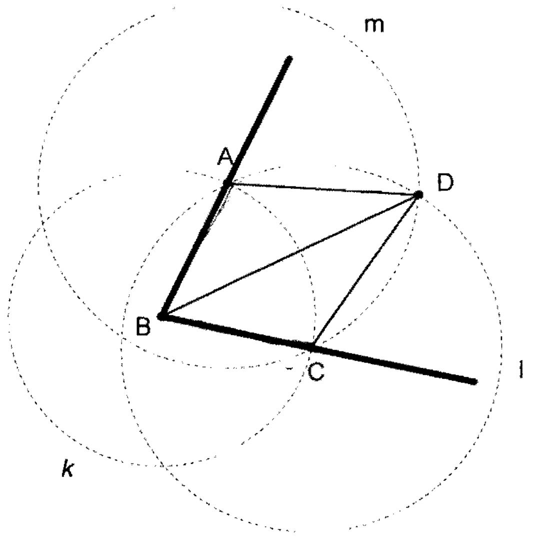
(iii) $\sqrt[5]{pq^2}$ in terms of m **2**

(b) In the diagram;

the circle k has centre B and radius BC.

the circle l has centre C and radius CA.

the circle m has centre A and radius AC.



(i) Prove $\Delta BAD \equiv \Delta BCD$ **4**

(ii) Prove BD bisects $A\hat{B}C$ **1**

(c) *Twinkle Finance* offers its investors the opportunity to have interest credited to their investment "as often as you wish". Naturally many investors punt for the "EVERY MINUTE" plan. *Twinkle* offer 12%pa.

(i) Stella invests \$1000 for a year with *Twinkle* on the "EVERY MINUTE" plan. Theoretically, *Twinkle's* computers multiply Stella's balance By approximately 1·000 000 228 every minute. Show why this is so. **2**

(ii) How much is Stella's investment worth after 1 year? **1**