9.

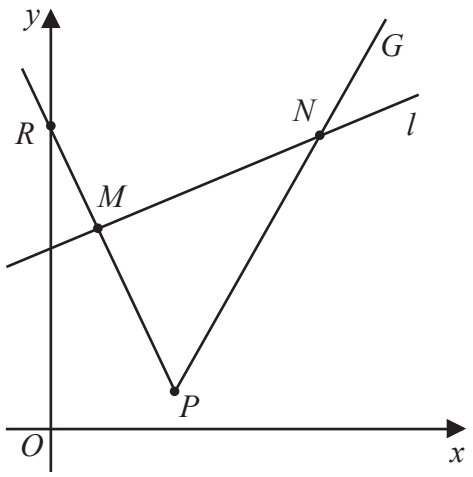


Figure 4

In this question you must show all stages of your working.
Solutions relying entirely on calculator technology are not acceptable.

Figure 4 shows

- the graph G with equation $y = |2x - k| + 3$
- the line l with equation $y = \frac{1}{2}x + \frac{k+7}{2}$

where k is a constant, $k > 1$

Given that G has a minimum point at P,

(a) find, in terms of k, the coordinates of P.

(2)

Given that l meets G at the points M and N, as shown in Figure 4,

(b) find, in terms of k, the x coordinate of M and the x coordinate of N.

(4)

Given also that

- graph G meets the y-axis at point R
- the area of triangle ORM is $\frac{33}{40}$ square units

(c) find the exact value of the area of triangle ORN.

(4)

(Total for Question 9 is 10 marks)

10. **In this question you must show all stages of your working.**
Solutions relying entirely on calculator technology are not acceptable.

(a) Show that

$$\cot x - \operatorname{cosec} 2x \equiv \cot 2x \qquad x \neq 90n° \qquad n \in \mathbb{Z}$$

(4)

(b) Using

- the answer to part (a)
- suitable trigonometric identities

solve, for $0 < \theta < 90°$, $\theta \neq 75°$ the equation

$$13 + \cot(\theta + 15°) - \operatorname{cosec}(2\theta + 30°) = \operatorname{cosec}^2(2\theta + 30°)$$

Give each of the answers to one decimal place.

(5)

(Total for Question 10 is 9 marks)

TOTAL FOR PAPER IS 75 MARKS