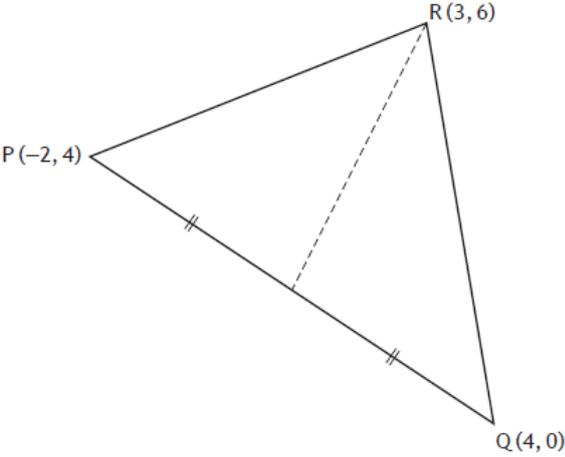
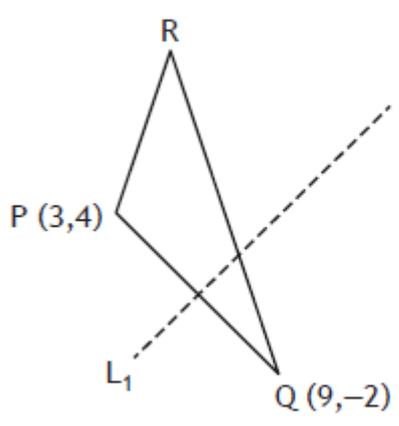
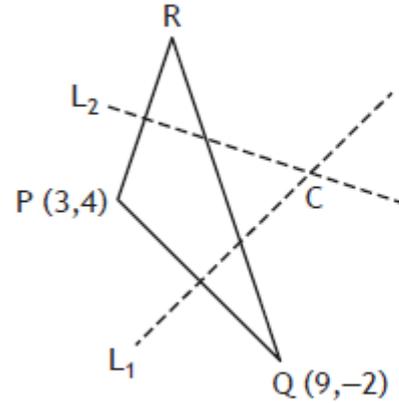


Higher : Straight Line

2018 P1 Q1	<p>PQR is a triangle with vertices P $(-2, 4)$, Q $(4, 0)$ and R $(3, 6)$.</p>  <p>Find the equation of the median through R.</p>	3
Ans	$y = 2x$	
2018 P1 Q8	<p>A line has equation $y - \sqrt{3}x + 5 = 0$.</p> <p>Determine the angle this line makes with the positive direction of the x-axis.</p>	2
Ans	60°	

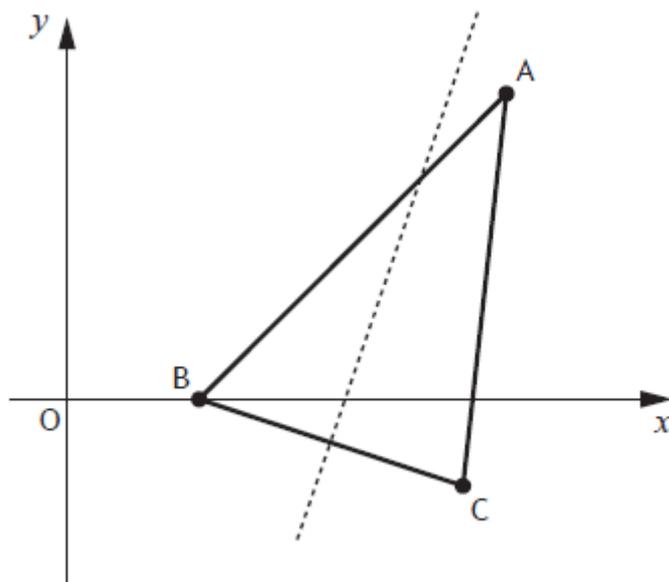
2018 P2 Q5(a)(b)	<p>PQR is a triangle with P(3,4) and Q(9,-2).</p> 	3
	<p>(a) Find the equation of L_1, the perpendicular bisector of PQ.</p> <p>The equation of L_2, the perpendicular bisector of PR is $3y + x = 25$.</p>  <p>(b) Calculate the coordinates of C, the point of intersection of L_1 and L_2.</p>	
Ans	(a) $y = x - 5$ (b) C(10,5)	
2017 P1 Q7	<p>A(-3, 5), B(7, 9) and C(2, 11) are the vertices of a triangle. Find the equation of the median through C.</p>	3
Ans	$x = 2$	
2017 P1 Q11	<p>A and B are the points (-7, 2) and (5, a). AB is parallel to the line with equation $3y - 2x = 4$. Determine the value of a.</p>	3
Ans	$a = 10$	

2017 P2 Q1

Triangle ABC is shown in the diagram below.

The coordinates of B are (3,0) and the coordinates of C are (9,-2).

The broken line is the perpendicular bisector of BC.



- (a) Find the equation of the perpendicular bisector of BC.
- (b) The line AB makes an angle of 45° with the positive direction of the x -axis.
Find the equation of AB.
- (c) Find the coordinates of the point of intersection of AB and the perpendicular bisector of BC.

4

2

2

Ans (a) $y = 3x - 19$ (b) $y = x - 3$ (c) (8, 5)

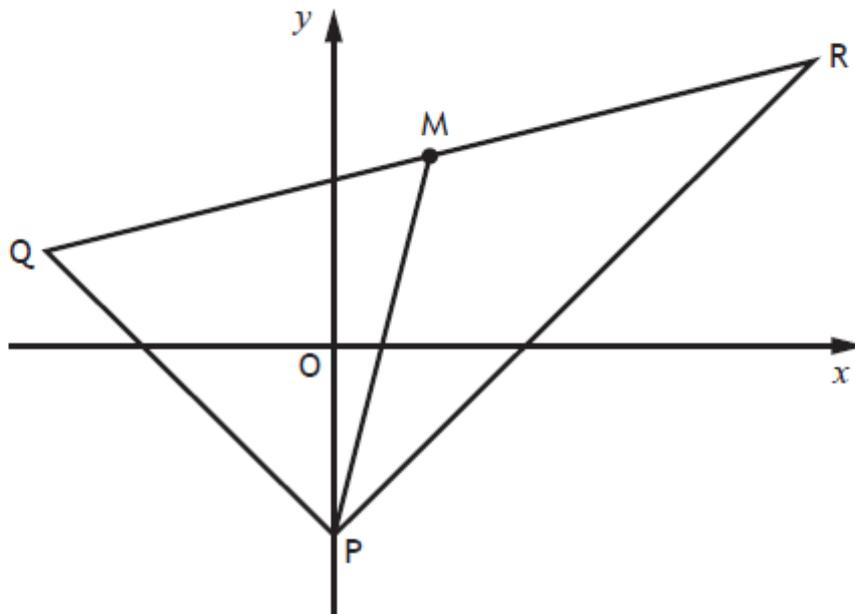
2016 P1 Q1

Find the equation of the line passing through the point $(-2, 3)$ which is parallel to the line with equation $y + 4x = 7$.

2

Ans $y + 4x = -5$

PQR is a triangle with vertices $P(0, -4)$, $Q(-6, 2)$ and $R(10, 6)$.



- (a) (i) State the coordinates of M , the midpoint of QR .
(ii) Hence find the equation of PM , the median through P .
- (b) Find the equation of the line, L , passing through M and perpendicular to PR .
- (c) Show that line L passes through the midpoint of PR .

1
2
3
3

Ans (a)(i) $(2, 4)$ (ii) $y = 4x - 4$ (b) $y = -x + 6$ (c) Proof

2015 NH P1 Q9

A , B and C are points such that AB is parallel to the line with equation $y + \sqrt{3}x = 0$ and BC makes an angle of 150° with the positive direction of the x -axis.
Are the points A , B and C collinear?

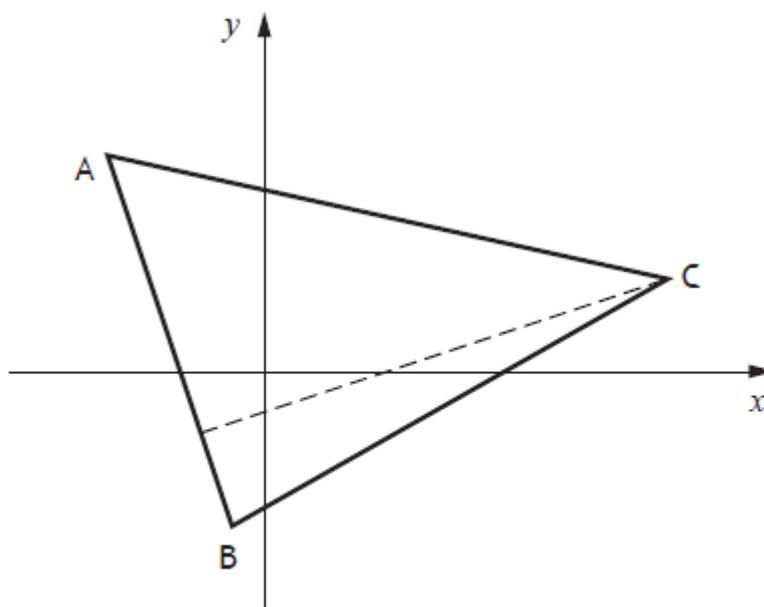
3

Ans Points are not collinear since $m_{AB} \neq m_{BC}$.

2015 NH P2 Q1

The vertices of triangle ABC are $A(-5, 7)$, $B(-1, -5)$ and $C(13, 3)$ as shown in the diagram.

The broken line represents the altitude from C.



- (a) Show that the equation of the altitude from C is $x - 3y = 4$.
- (b) Find the equation of the median from B.
- (c) Find the coordinates of the point of intersection of the altitude from C and the median from B.

4

3

2

Ans (a) $x - 3y = 4$ (b) $y = 2x - 3$ (c) $(1, -1)$

2015 P1 Q2

The line with equation $2y = 3x + 5$ is perpendicular to the line with equation $y = kx$.
What is the value of k ?

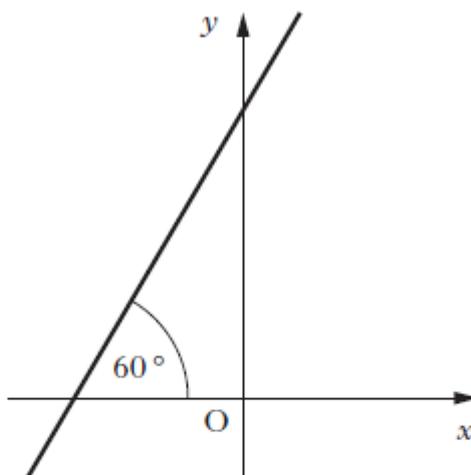
- A $-\frac{3}{2}$
- B $-\frac{2}{3}$
- C $\frac{2}{3}$
- D $\frac{3}{2}$

2

Ans B

2015 PI Q8

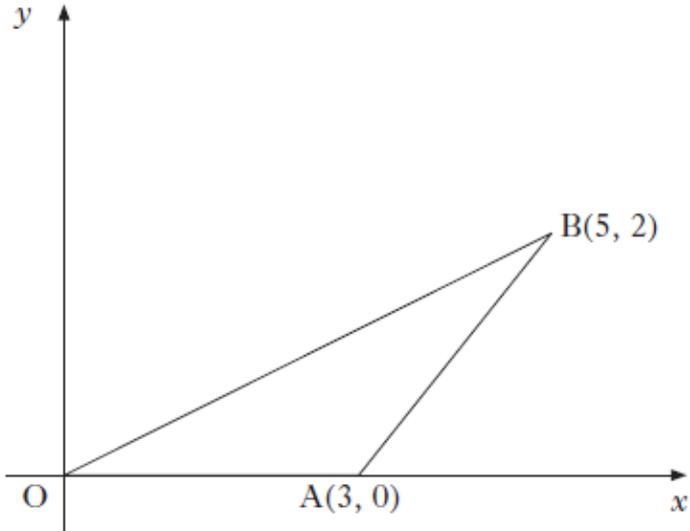
A straight line makes an angle of 60° with the x -axis as shown in the diagram.



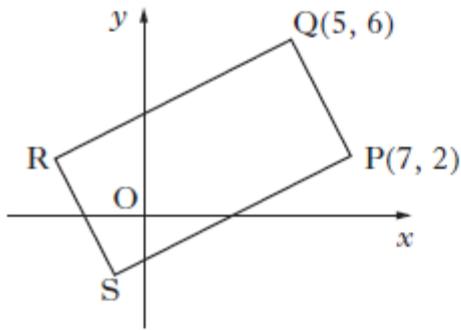
What is the gradient of this line?

- A $\frac{1}{2}$
- B $\frac{1}{\sqrt{3}}$
- C $\frac{\sqrt{3}}{2}$
- D $\sqrt{3}$

Ans D

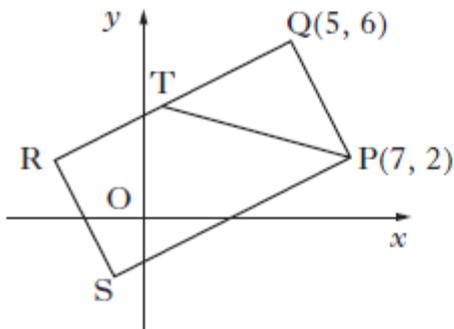
2014 P2 Q1	<p>A(3, 0), B(5, 2) and the origin are the vertices of a triangle as shown in the diagram.</p>  <p>(a) Obtain the equation of the perpendicular bisector of AB. 4</p> <p>(b) The median from A has equation $y + 2x = 6$. Find T, the point of intersection of this median and the perpendicular bisector of AB. 2</p> <p>(c) Calculate the angle that AT makes with the positive direction of the x-axis. 2</p>
Ans	(a) $y = -x + 5$ (b) $T(1, 4)$ (c) 116.6°
2013 P1 Q5	<p>The line L passes through the point $(-2, -1)$ and is parallel to the line with equation $5x + 3y - 6 = 0$.</p> <p>What is the equation of L?</p> <p>A $3x + 5y - 11 = 0$</p> <p>B $3x + 5y + 11 = 0$</p> <p>C $5x + 3y - 13 = 0$</p> <p>D $5x + 3y + 13 = 0$</p> <p style="text-align: right;">2</p>
Ans	D

The diagram shows rectangle PQRS with P(7, 2) and Q(5, 6).



(a) Find the equation of QR.

(b) The line from P with the equation $x + 3y = 13$ intersects QR at T.



Find the coordinates of T.

(c) Given that T is the midpoint of QR, find the coordinates of R and S.

2013 P2 Q2

3

3

3

Ans (a) $2y = x + 7$ (b) $T(1, 4)$ (c) $R(-3, 2), S(-1, -2)$

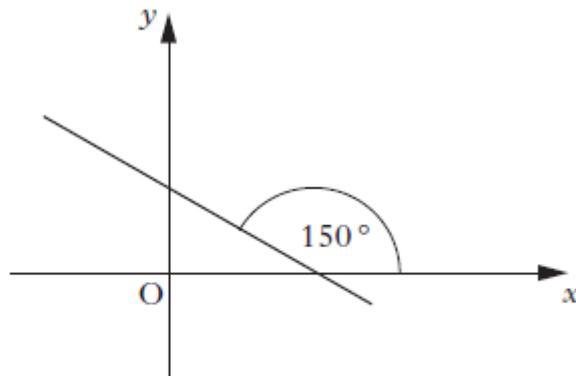
What is the gradient of the line shown in the diagram?

A $-\sqrt{3}$

B $-\frac{1}{\sqrt{3}}$

C $-\frac{1}{2}$

D $-\frac{\sqrt{3}}{2}$



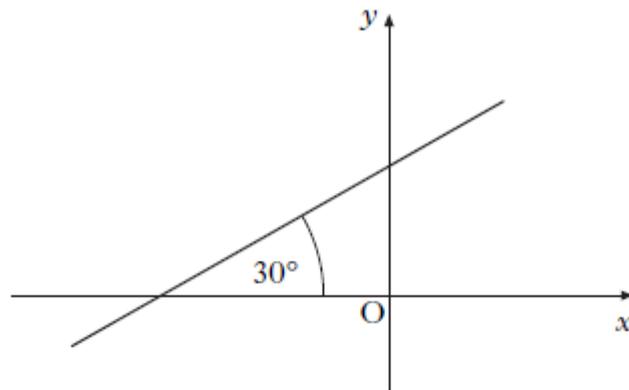
2012 P1 Q4

2

Ans B

2012 P1 Q23	<p>(a) Find the equation of ℓ_1, the perpendicular bisector of the line joining P(3, -3) to Q(-1, 9).</p> <p>(b) Find the equation of ℓ_2 which is parallel to PQ and passes through R(1, -2).</p> <p>(c) Find the point of intersection of ℓ_1 and ℓ_2.</p> <p>(d) Hence find the shortest distance between PQ and ℓ_2.</p>	4 2 3 2
Ans	<p>(a) $3y = x + 8$ (b) $y = -3x + 1$ (c) $(-0.5, 2.5)$ (d) $\sqrt{\frac{5}{2}}$</p>	
2011 P1 Q2	<p>A line l has equation $3y + 2x = 6$.</p> <p>What is the gradient of any line parallel to l?</p> <p>A -2</p> <p>B $-\frac{2}{3}$</p> <p>C $\frac{3}{2}$</p> <p>D 2</p>	2
Ans	B	

A line makes an angle of 30° with the positive direction of the x -axis as shown.



What is the gradient of the line?

- A $\frac{1}{\sqrt{3}}$
- B $\frac{1}{\sqrt{2}}$
- C $\frac{1}{2}$
- D $\frac{\sqrt{3}}{2}$

2011 P1 Q8

2

Ans A

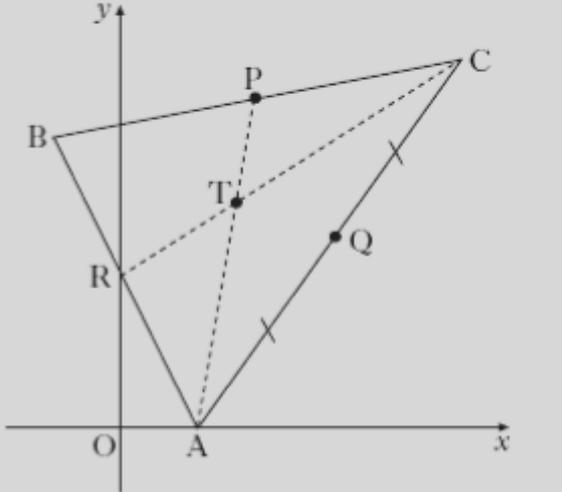
On a suitable domain, D, a function g is defined by $g(x) = \sin^2 \sqrt{x-2}$.
Which of the following gives the real values of x in D and the corresponding values of $g(x)$?

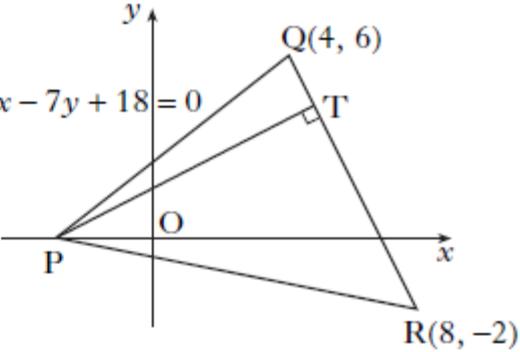
- A $x \geq 0$ and $-1 \leq g(x) \leq 1$
- B $x \geq 0$ and $0 \leq g(x) \leq 1$
- C $x \geq 2$ and $-1 \leq g(x) \leq 1$
- D $x \geq 2$ and $0 \leq g(x) \leq 1$

2011 P1 Q20

2

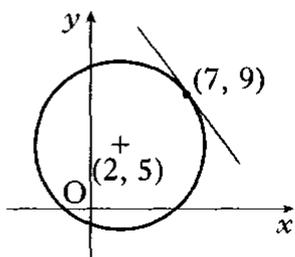
Ans D

2010 P1 Q1	<p>A line L is perpendicular to the line with equation $2x - 3y - 6 = 0$.</p> <p>What is the gradient of the line L?</p> <p>A $-\frac{3}{2}$</p> <p>B $-\frac{1}{2}$</p> <p>C $\frac{2}{3}$</p> <p>D 2</p>	2
Ans	A	
2010 P1 Q21	<p>Triangle ABC has vertices A(4, 0), B(-4, 16) and C(18, 20), as shown in the diagram opposite.</p> <p>Medians AP and CR intersect at the point T(6, 12).</p>  <p>(a) Find the equation of median BQ.</p> <p>(b) Verify that T lies on BQ.</p> <p>(c) Find the ratio in which T divides BQ.</p>	3 1 2
Ans	(a) $2x + 5y = 72$ (c) $2:1$	
2009 P1 Q3	<p>Triangle PQR has vertices at P(-3, -2), Q(-1, 4) and R(3, 6).</p> <p>PS is a median. What is the gradient of PS?</p> <p>A -2</p> <p>B $-\frac{7}{4}$</p> <p>C 1</p> <p>D $\frac{7}{4}$</p>	2
Ans	D	

2009 P1 Q5	<p>Here are two statements about the points S(2, 3) and T(5, -1):</p> <p>(1) The length of ST = 5 units;</p> <p>(2) The gradient of ST = $\frac{4}{3}$.</p> <p>Which of the following is true?</p> <p>A Neither statement is correct.</p> <p>B Only statement (1) is correct.</p> <p>C Only statement (2) is correct.</p> <p>D Both statements are correct.</p>	2	
Ans	B		
2009 P1 Q21	<p>Triangle PQR has vertex P on the x-axis, as shown in the diagram.</p> <p>Q and R are the points (4, 6) and (8, -2) respectively.</p> <p>The equation of PQ is $6x - 7y + 18 = 0$.</p> <p>(a) State the coordinates of P.</p> <p>(b) Find the equation of the altitude of the triangle from P.</p> <p>(c) The altitude from P meets the line QR at T. Find the coordinates of T.</p>		1 3 4
Ans	(a) P(-3, 0) (b) $2y = x + 3$ (c) T(5, 4)		

2008 P1 Q5

The diagram shows a circle, centre $(2, 5)$ and a tangent drawn at the point $(7, 9)$.
What is the equation of this tangent?



A $y - 9 = -\frac{5}{4}(x - 7)$

B $y + 9 = -\frac{4}{5}(x + 7)$

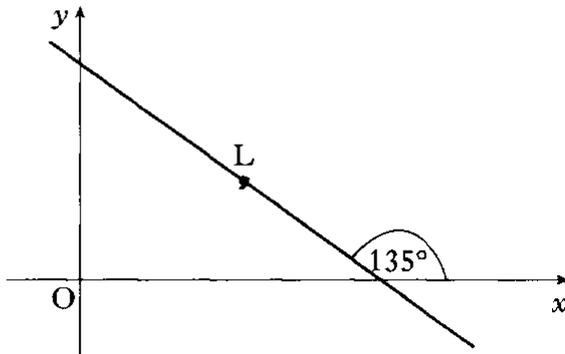
C $y - 7 = \frac{4}{5}(x - 9)$

D $y + 9 = \frac{5}{4}(x + 7)$

Ans

A

The diagram shows a line L; the angle between L and the positive direction of the x-axis is 135° , as shown.



What is the gradient of line L?

- A $-\frac{1}{2}$
- B $-\frac{\sqrt{3}}{2}$
- C -1
- D $\frac{1}{2}$

2008 P1 Q7

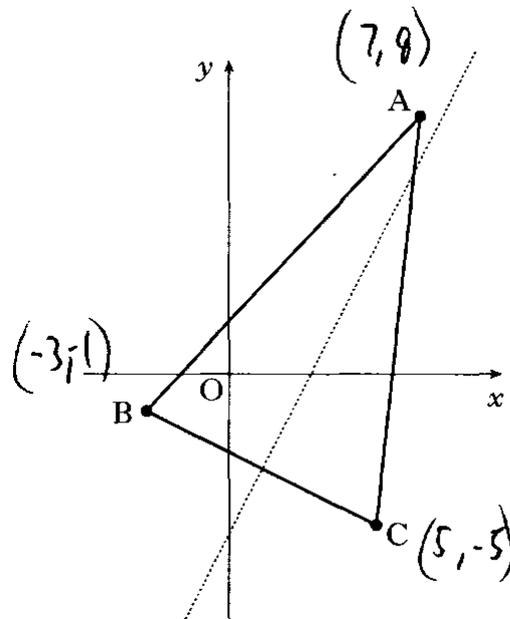
2

Ans C

The vertices of triangle ABC are A(7, 9), B(-3, -1) and C(5, -5) as shown in the diagram.

The broken line represents the perpendicular bisector of BC.

- (a) Show that the equation of the perpendicular bisector of BC is $y = 2x - 5$.
- (b) Find the equation of the median from C.
- (c) Find the coordinates of the point of intersection of the perpendicular bisector of BC and the median from C.



2008 P2 Q1

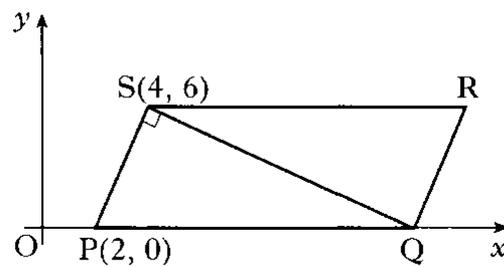
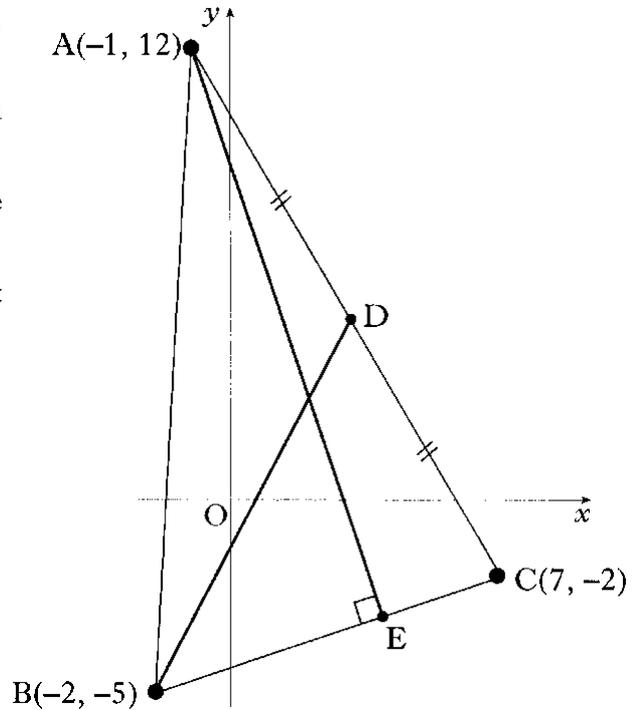
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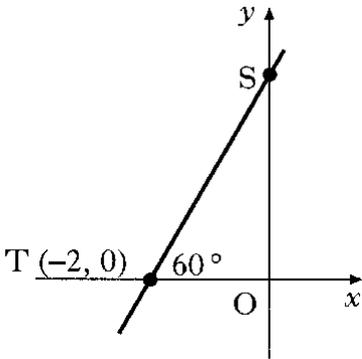
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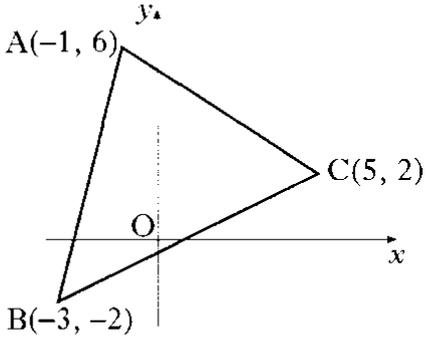
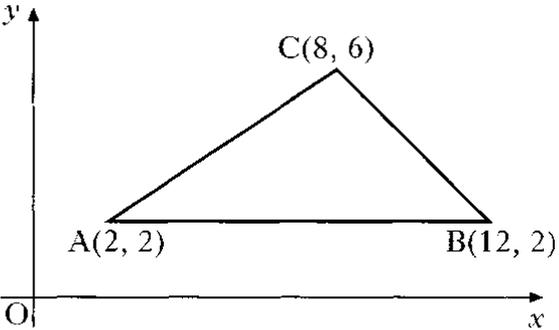
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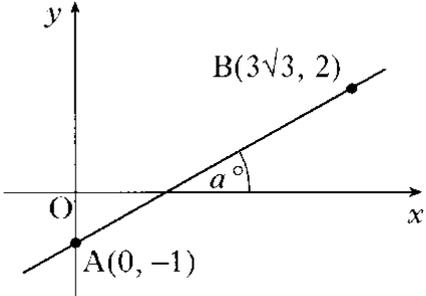
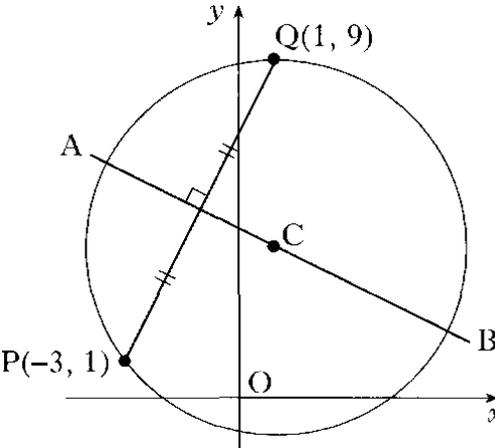
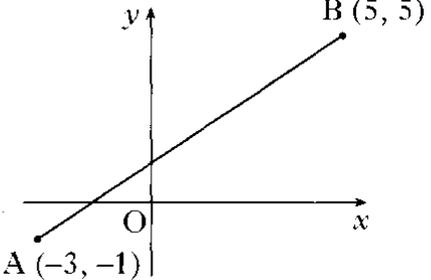
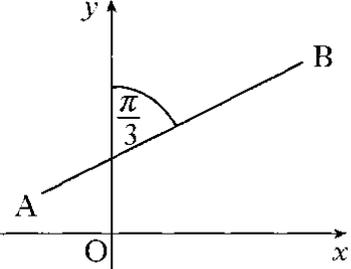
Ans (a) Proof (b) $y = -3x + 10$ (c) (3, 1)

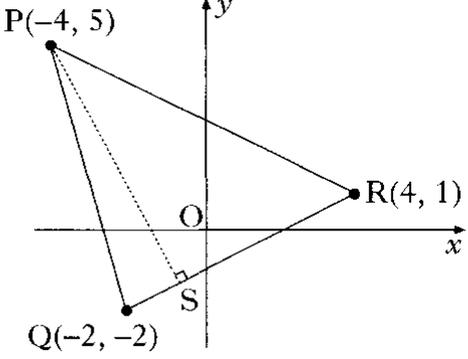
2007 P1 Q1	Find the equation of the line through the point $(-1, 4)$ which is parallel to the line with equation $3x - y + 2 = 0$.	3
Ans	$y = 3x + 7$	
2006 P1 Q1	<p>Triangle ABC has vertices $A(-1, 12)$, $B(-2, -5)$ and $C(7, -2)$.</p> <p>(a) Find the equation of the median BD.</p> <p>(b) Find the equation of the altitude AE.</p> <p>(c) Find the coordinates of the point of intersection of BD and AE.</p>	3 3 3
Ans	<p>(a) $y - 5 = 2(x - 3)$ or $y + 5 = 2(x - (-2))$ etc</p> <p>(b) $y - 12 = -3(x - (-1))$</p> <p>(c) $(2, 3)$</p>	
2006 P2 Q1	<p>PQRS is a parallelogram. P is the point $(2, 0)$, S is $(4, 6)$ and Q lies on the x-axis, as shown.</p> <p>The diagonal QS is perpendicular to the side PS.</p>	4 2



<p><i>Ans</i></p>	<p>(a) proof $m_{PS} = 3$ $m_{QS} = -\frac{1}{3}$ $y - 6 = -\frac{1}{3}(x - 4)$</p> <p>(b) Q = (22, 0) R = (24, 6)</p>	
<p>2005 P1 Q1</p>	<p>Find the equation of the line ST, where T is the point (-2, 0) and angle STO is 60°.</p> 	<p>3</p>
<p><i>Ans</i></p>	$y - 0 = \sqrt{3}(x - (-2))$	
<p>2004 P1 Q1</p>	<p>The point A has coordinates (7, 4). The straight lines with equations $x + 3y + 1 = 0$ and $2x + 5y = 0$ intersect at B.</p> <p>(a) Find the gradient of AB.</p> <p>(b) Hence show that AB is perpendicular to only one of these two lines.</p>	<p>3 5</p>
<p><i>Ans</i></p>	<p>(a) $m_{AB} = 3$</p> <p>(b) $m_{AB} = 3 \Rightarrow m_{\text{perp}} = -\frac{1}{3}$</p> $y = -\frac{1}{3}x - \frac{1}{3}$ $m_{l_1} = -\frac{1}{3}$ $m_{l_2} = -\frac{2}{5}$ <p>so only the 1st line is perpendicular to AB.</p>	

2002 P2 Q1	<p>Triangle ABC has vertices A(-1, 6), B(-3, -2) and C(5, 2). Find</p> <p>(a) the equation of the line p, the median from C of triangle ABC.</p> <p>(b) the equation of the line q, the perpendicular bisector of BC.</p> <p>(c) the coordinates of the point of intersection of the lines p and q.</p>		3 4 1
Ans	<p>(a) $y = 2$</p> <p>(b) $y = -2x + 2$</p> <p>(c) (0, 2)</p>		
2001 P1 Q1	<p>Find the equation of the straight line which is parallel to the line with equation $2x + 3y = 5$ and which passes through the point (2, -1).</p>		3
Ans	<p>$2x + 3y = 1$</p>		
2001 P2 Q7	<p>Triangle ABC has vertices A(2, 2), B(12, 2) and C(8, 6). (a) Write down the equation of l_1, the perpendicular bisector of AB. (b) Find the equation of l_2, the perpendicular bisector of AC. (c) Find the point of intersection of lines l_1 and l_2. (d) Hence find the equation of the circle passing through A, B and C.</p>		1 4 1 2
Ans	<p>(a) $x = 7$</p> <p>(b) $3x + 2y = 23$</p> <p>(c) (7, 1)</p> <p>(d) $(x - 7)^2 + (y - 1)^2 = 26$</p>		

2000 P1 Q3	<p>Find the size of the angle a° that the line joining the points $A(0, -1)$ and $B(3\sqrt{3}, 2)$ makes with the positive direction of the x-axis.</p>		3
Ans	30°		
2000 P2 Q2(a)	<p>Find the equation of AB, the perpendicular bisector of the line joining the points $P(-3, 1)$ and $Q(1, 9)$.</p>		4
Ans	(a) $x + 2y = 9$		
Specimen 2 P1 Q2	<p>A and B are the points $(-3, -1)$ and $(5, 5)$. Find the equation of the perpendicular bisector of AB.</p>		4
Ans	$m_{AB} = \frac{3}{4} \Rightarrow m_{perp} = -\frac{4}{3}$ midpoint = $(1, 2)$ $y - 2 = -\frac{4}{3}(x - 1)$		
Specimen 2 P1 Q4	<p>The line AB makes an angle of $\frac{\pi}{3}$ radians with the y-axis, as shown in the diagram. Find the exact value of the gradient of AB.</p>		2

<p><i>Ans</i></p>	<p>angle between line and x-axis = $\frac{\pi}{2} - \frac{\pi}{3}$ gradient = $\tan \frac{\pi}{6} = \frac{1}{\sqrt{3}}$</p>	
<p><i>Specimen 1 P1 Q1</i></p>	<p>P(-4, 5), Q(-2, -2) and R(4, 1) are the vertices of triangle PQR as shown in the diagram. Find the equation of PS, the altitude from P.</p>	
<p><i>Ans</i></p>	<p>$y = -2x - 3$</p>	
<p><i>Specimen 1 P2 Q1</i></p>	<p>ABCD is a parallelogram. A, B and C have coordinates (2, 3), (4, 7) and (8, 11). Find the equation of DC.</p>	
<p><i>Ans</i></p>	<p>$y = 2x - 5$</p>	