Straight Line

Go to the appropriate Past Paper for the answers

2019 Paper 1

7. The line, L, makes an angle of 30° with the positive direction of the x-axis.

Find the equation of the line perpendicular to L, passing through $(0,-4)$. **4**

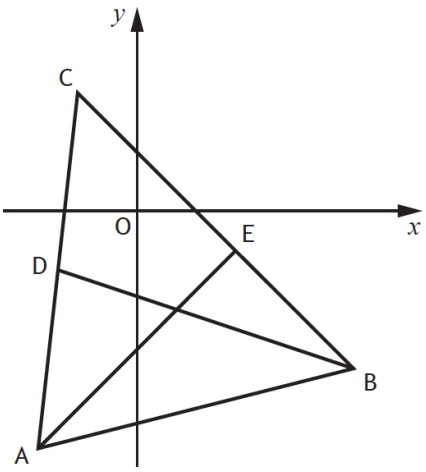
2019 Paper 2

1. Triangle ABC has vertices A(−5,−12), B(11,−8) and C(−3,6).

(a) Find the equation of the median BD. **3**

(b) Find the equation of the altitude AE. **3**

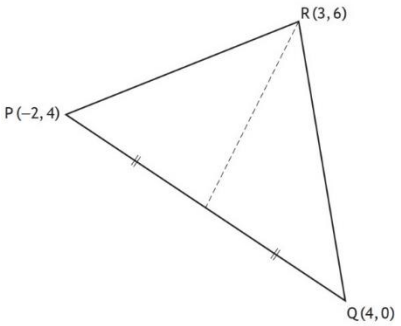
(c) Find the coordinates of the point of intersection of BD and AE. **2**



2018 Paper 1

1. PQR is a triangle with vertices P (−2, 4), Q (4, 0) and R (3, 6).

Find the equation of the median through R. **3**



2018 Paper 1

8. A line has equation $y-\sqrt{3}x+5=0$.

Determine the angle this line makes with the positive direction of the x-axis. **2**

2018 Paper 2

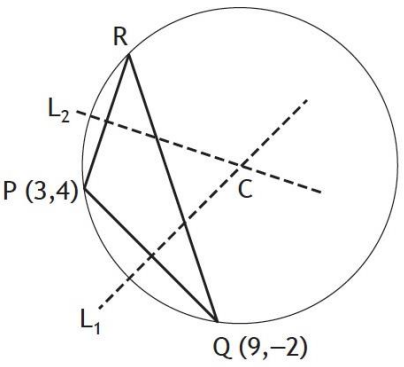
5. PQR is a triangle with P(3,4) and Q(9,−2).

(a) Find the equation of L_1, the perpendicular bisector of PQ. **3**

The equation of L_2, the perpendicular bisector of PR is $3y+x=25$.

(b) Calculate the coordinates of C, the point of intersection of L_1 and L_2. **2**

(c) Determine the equation of this circle. **2**



Specimen 5 Paper 1

1. A curve has equation $y = x^2 - 4x + 7$.

Find the equation of the tangent to this curve at the point where $x = 5$. **4**

Specimen 5 Paper 1

3. Line l_1 has equation $\sqrt{3}y - x = 0$.

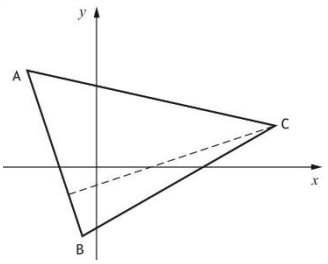
(a) Line l_2 is perpendicular to l_1. Find the gradient of l_2. **2**

(b) Calculate the angle l_2 makes with the positive direction of the x-axis. **2**

Specimen 5 Paper 2

1. 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) Find the equation of the altitude from C. **3**

(b) Find the equation of the median from B. **3**

(c) Find the coordinates of the point of intersection of the altitude from C and the median from B. **2**

2017 Paper 1

7. A (–3, 5), B (7, 9) and C (2, 11) are the vertices of a triangle.

Find the equation of the median through C. **3**

2017 Paper 1

11. A and B are the points (–7, 2) and (5, a).

AB is parallel to the line with equation $3y - 2x = 4$. **3**

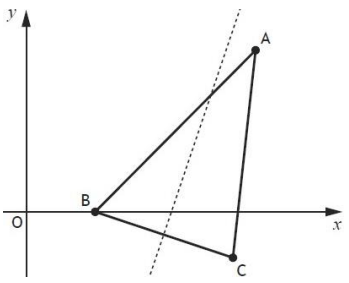
Determine the value of a.

2017 Paper 2

1. 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. **4**

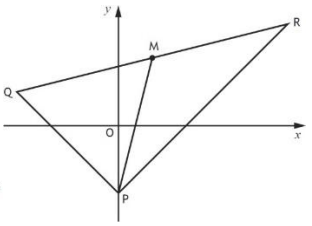
(b) The line AB makes an angle of 45° with the positive direction of the x-axis. **2**

Find the equation of AB.

(c) Find the coordinates of the point of intersection of AB and the perpendicular bisector of BC. **2**

2016 Paper 2

1. 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. **1**

(ii) Hence find the equation of PM, the median through P. **2**

(b) Find the equation of the line, *L*, passing through M and perpendicular to PR. **3**

(c) Show that line *L* passes through the midpoint of PR. **3**

2016 Paper 1

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

New 2015 Paper 1

9. 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. **3**

Are the points A, B and C collinear?

Specimen 4 Paper 1

5. Line l_1 has equation $\sqrt{3}y-x=0$.

(a) Line l_2 is perpendicular to l_1. Find the gradient of l_2. **2**

(b) Calculate the angle l_2 makes with the positive direction of the x-axis. **2**

Specimen 4 Paper 1

9. (a) AB is a line parallel to the line with equation $y+3x=25$.

A has coordinates $(-1,\ 10)$.

Find the equation of AB. **1**

(b) $3y=x+11$ is the perpendicular bisector of AB.

Determine the coordinates of B. **5**

Exemplar Paper 1

6. (a) Find the equation of l_1, the perpendicular bisector of the line joining P $(3,-3)$ and Q $(-1,9)$. **4**

(b) Find the equation of l_2 which is parallel to PQ and passes through R $(1,-2)$. **2**

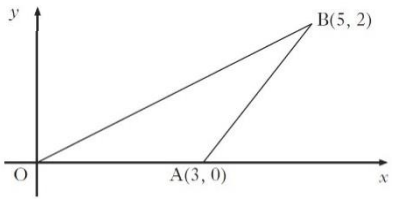
(c) Find the point of intersection of l_1 and l_2. **2**

(d) Hence find the shortest distance between PQ and l_2. **3**

2014 Paper 2

1. A(3, 0), B(5, 2) and the origin are the vertices of a triangle as shown in the diagram.

(*a*) Obtain the equation of the perpendicular bisector of AB. **4**



(*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**

(*c*) Calculate the angle that AT makes with the positive direction of the x-axis. **2**

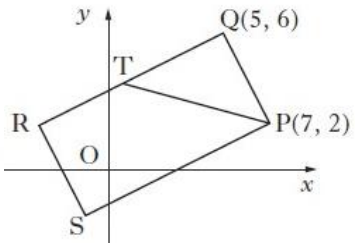
2013 Paper 1

5. The line L passes through the point $(-2, -1)$ and is parallel to the line with equation $5x + 3y - 6 = 0$. **2**

What is the equation of L?

2013 Paper 2

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



(*a*) Find the equation of QR. **3**

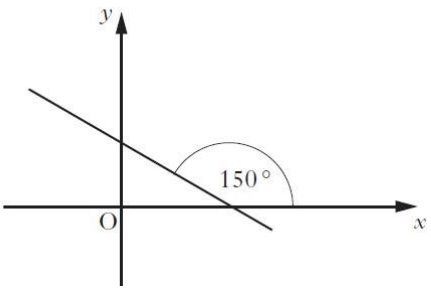
(*b*) The line from P with the equation $x + 3y = 13$ intersects QR at T.

Find the coordinates of T. **3**

(*c*) Given that T is the midpoint of QR, find the coordinates of R and S. **3**

2012 Paper 1

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



A $-\sqrt{3}$

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

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

2012 Paper 1

23. (*a*) Find the equation of ℓ_1, the perpendicular bisector of the line joining P(3, –3) to Q(–1, 9). **4**

(*b*) Find the equation of ℓ_2 which is parallel to PQ and passes through R(1, –2). **2**

(*c*) Find the point of intersection of ℓ_1 and ℓ_2. **3**

(*d*) Hence find the shortest distance between PQ and ℓ_2. **2**

2011 Paper 1

2. A line l has equation $3y + 2x = 6$.

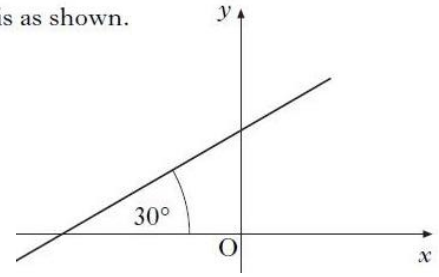
What is the gradient of any line parallel to l?

2

2011 Paper 1

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

What is the gradient of the line?



2

2011 Paper 1

21. A quadrilateral has vertices A(–1, 8), B(7, 12), C(8, 5) and D(2, –3)

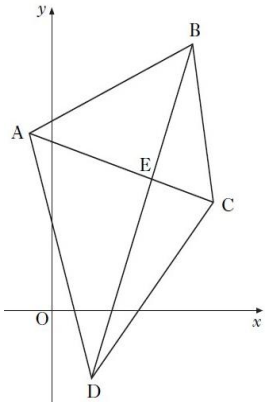
(*a*) Find the equation of diagonal BD. 2

(*b*) The equation of diagonal AC is $x + 3y = 23$.

Find the coordinates of E, the point of intersection of the diagonals. 3

(*c*) (i) Find the equation of the perpendicular bisector of AB.

(ii) Show that this line passes through E. 5



2010 Paper 1

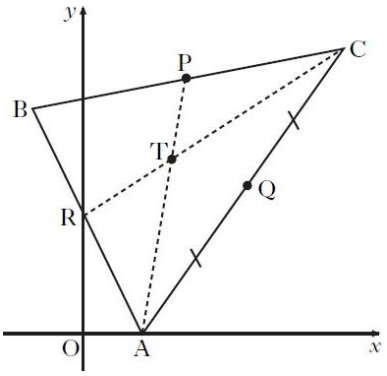
21. Triangle ABC has vertices A(4, 0), B(–4, 16) and C(18, 20), as shown in the diagram opposite.

Medians AP and CR intersect at the point T(6, 12).

(*a*) Find the equation of median BQ. 3

(*b*) Verify that T lies on BQ. 1

(*c*) Find the ratio in which T divides BQ. 2



2010 Paper 1

1. A line L is perpendicular to the line with equation $2x - 3y - 6 = 0$.

What is the gradient of the line L? 2

2009 Paper 1

3. Triangle PQR has vertices at P(–3, –2), Q(–1, 4) and R(3, 6).

PS is a median. What is the gradient of PS? 2

2009 Paper 1

5. Here are two statements about the points S(2, 3) and T(5, –1):

(1) The length of ST = 5 units;

(2) The gradient of ST = $\frac{4}{3}$.

Which of the following is true? **2**

A Neither statement is correct.

B Only statement (1) is correct.

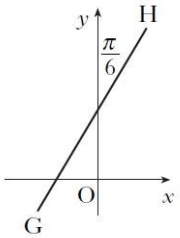
C Only statement (2) is correct.

D Both statements are correct.

2009 Paper 1

15. The line GH makes an angle of $\frac{\pi}{6}$ radians with the y-axis, as shown in the diagram.

What is the gradient of GH? **2**

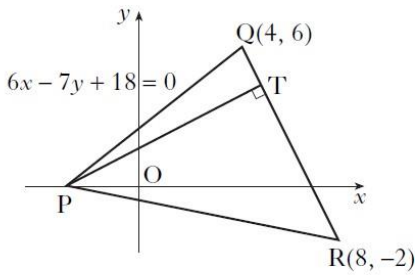


2009 Paper 1

21. Triangle PQR has vertex P on the x-axis, as shown in the diagram.

Q and R are the points (4, 6) and (8, –2) respectively.

The equation of PQ is $6x - 7y + 18 = 0$.



(*a*) State the coordinates of P. **1**

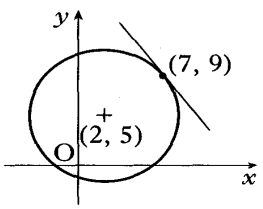
(*b*) Find the equation of the altitude of the triangle from P. **3**

(*c*) The altitude from P meets the line QR at T. Find the coordinates of T. **4**

2008 Paper 1

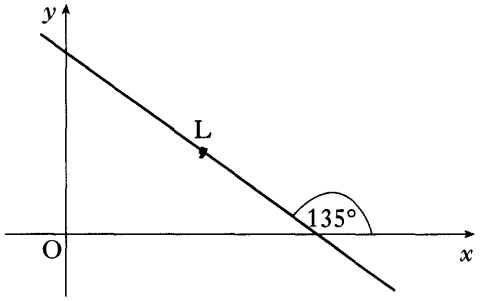
5. The diagram shows a circle, centre (2, 5) and a tangent drawn at the point (7, 9).

What is the equation of this tangent? **2**



2008 Paper 1

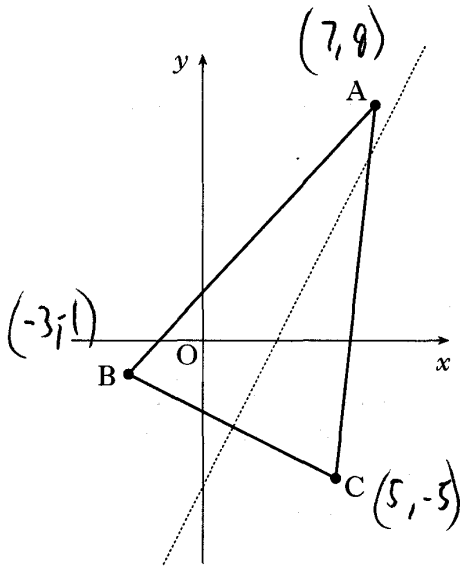
7. The diagram shows a line L; the angle between L and the positive direction of the x-axis is 135°, as shown.



What is the gradient of line L? 2

2008 Paper 2

1. 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 $y = 2x - 5$. 4

(*b*) Find the equation of the median from C. 3

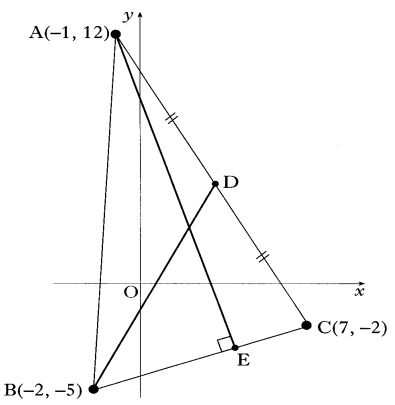
(*c*) Find the coordinates of the point of intersection of the perpendicular bisector of BC and the median from C. 3

2007 Paper 1

1. Find the equation of the line through the point (–1, 4) which is parallel to the line with equation $3x - y + 2 = 0$. 3

2006 Paper 1

1. Triangle ABC has vertices A(–1, 12), B(–2, –5) and C(7, –2).



(*a*) Find the equation of the median BD. 3

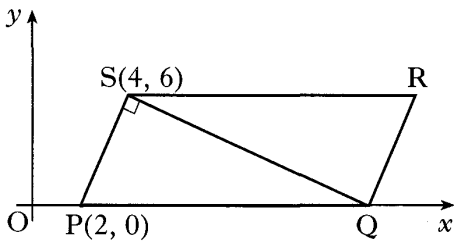
(*b*) Find the equation of the altitude AE. 3

(*c*) Find the coordinates of the point of intersection of BD and AE. 3

2006 Paper 2

1. PQRS is a parallelogram. P is the point (2, 0), S is (4, 6) and Q lies on the x-axis, as shown.

The diagonal QS is perpendicular to the side PS.

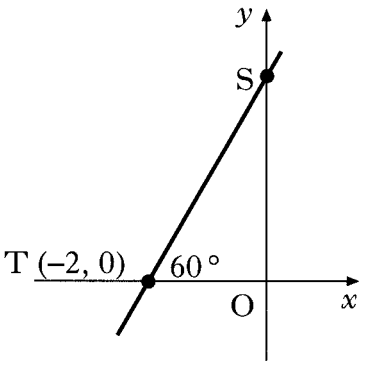


(a) Show that the equation of QS is $x + 3y = 22$. **4**

(b) Hence find the coordinates of Q and R. **2**

2005 Paper 1

1. Find the equation of the line ST, where T is the point (–2, 0) and angle STO is 60 °.



3

2004 Paper 1

1. The point A has coordinates (7, 4). The straight lines with equations $x + 3y + 1 = 0$ and $2x + 5y = 0$ intersect at B.

(a) Find the gradient of AB. **3**

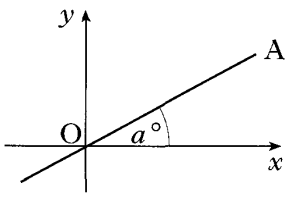
(b) Hence show that AB is perpendicular to only one of these two lines. **5**

2004 Paper 2

1. (a) The diagram shows line OA with equation $x - 2y = 0$.

The angle between OA and the x-axis is a °.

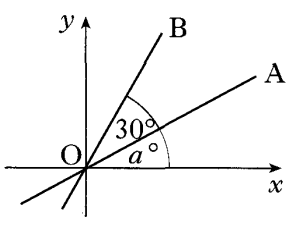
Find the value of a.



3

(b) The second diagram shows lines OA and OB. The angle between these two lines is 30 °.

Calculate the gradient of line OB correct to 1 decimal place.



1