#### **Foundation stage 1:**

- 1. Use the midpoint formula:  $x = \frac{x_1 + x_2}{2}$ ,  $y = \frac{y_1 + y_2}{2}$  to find the midpoint of each interval AB:
  - (a) A(3, 7) and B(7, 12)

(b) A(-4, 3) and (5, -8)

- JE MATHS
- JE MATHS

JE MATHS

- (c) A(-3, -1) and B(-5, -6)
- IE MATHS
- (d) A(2, -13) and (-11, -4)  $\mathbf{R}$  MATHS
- 2. Use the distance formula:  $AB = \sqrt{(x_1 x_2)^2 + (y_1 y_2)^2}$  to find the distance of each interval AB:
  - (a) A(3, 7) and  $B(7, 12)^{S}$

- (b) A(-4, 3) and (5, -8)
- JE MATHS

- \_\_\_\_\_
  - JE MATHS

JE MATHS



(c) A(-3, -1) and B(-5, -6)

- (d) A(2, -13) and (-11, -4)
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  - ATHS \_
    - JE MATHS
- 3. Given that the midpoint of AB is C, where A(-2, 7) and B(-5, -3), show that AC = BC.

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4.	Given that $A(-2, -1)$ , $B(-1, 3)$ and $C(3, 4)$ ,	show that $\triangle$ ABC is an is	an isosceles triangle.		
	and the second s				
	JE MATHS	JE MATHS		JE MATHS	
5.	Given that A(-5, -6), B(4, 6) and C(20, -6)	).	JE MATHS		
	(a) Show that $\triangle$ ABC is a right-angled triangle by using the distance formula only.				
		JE MATHS			
		-			
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	JB Wy.			IB WY.	
		uS			
	(b) Hence, state which angle is 90 °.	JE MATHS			
	JE MATHS		JE MATHS		
	(c) Given that the midpoing of AC is D, find the coordinate of D.				
	Nonemark Mark				
		JE MATHS			
	(d) Hence, show that $AD = CD = BD$ .				
	JB MAII				
	* 17-10 DE-				
	JE MATHS	JE MATHS		JE MATHS	
	IR to	In was		]β <sub>m</sub>	

#### **Foundation stage 2:**

1. Use the gradient formula:  $m = \frac{y_2 - y_1}{x_2 - x_1}$  to find the gradient of each interval AB:

JE MATHS

(a) A(3, 7) and B(7, 12)

(b) A(-4, 3) and (5, -8)

JE MATHS

JE MATHS

JE MATHS

(c) A(-3, -1) and B(-5, -6)

(d) A(2, -13) and (-11, -4)

JE MATHS

(e) A(-5, -6), B(20, -6)

(f) A(-5, 20), B(-5, -6)

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- 2. Find the gradient of a line parallel to the given line with the gradient. \*B MATHS\*
  - (a) 3

JE MATHS

(c)  $-\frac{5}{3}$ 

(d)  $-2\frac{1}{3}$ 

JE MATHS

- 3. Find the gradient of a line perpendicular to the given line with the gradient:
  - (a) 3

JE MATHS (c)  $-\frac{5}{3}$ 

JE MATHS

(d)  $-2\frac{1}{3}$ 

4.	Show that A(-1, -5), I gradient of AB, BC, CD		) and D(9, -	-7) form a paralle	logram by finding the
	N <sub>c</sub> -1440 Aust				
	N-14800-98-0				
	A_virtuality_enter				
	JE MATHS		JE MATHS		JE MATHS
	46% materials				
	as Military politique				
		JE MATHS		JE M <sup>A</sup>	THS
5.	Given that A(-5, -6), B( the gradient formula on	(4, 6) and C(20, -6	). Show that	Δ ABC is a right-a	ingled triangle by using
	4,-0465-050				
	water the second			JE MATHS	
	Apply allocated				
	JE MATH	S			JE MATHS
	The second				Ju
	and All Construction and All C				
			JE MATHS		
6.	Givne that A(2, 2), B(-2 (a) Show that ABCD is	2, 1), C(-1, -3) and a rectangle by find	D(3, -2).	ient of AB, BC, CI	D and DA.
	N_101803-0-20-2				
	N_ +10 MI A + 10				
	No. of Miller of the A	JE MATHS			
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	No. of the Control of			. mus	
	***			JE MATHS	
	JE MATH	S			
	TB Wyr.				
(b) Hence, show that ABCD is also a square by finding the distance of AB, BC, CD and DA					B, BC, CD and DA.
	ATUS		mus		. mus
	JE MATHS		JE MATHS		JE MATHS
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			*=::::*:::
7.	Use the formula $m = \tan \alpha$ to fine given that its angle of inclination i	<del>-</del>	cimal places if necessary,
	(a) 25 °	(b) 72.5 °	
	and a second		
	(c) 135 MATHS	(d) 102°53'	JE MATHS
O	JB MA		JE MATHS
8.	Use the formula $m = \tan \alpha$ to fin necessary, given that its gradient is		me, to the hearest degreee if
	(a) 1	(b) $\sqrt{3}$	
	w.	IB MA	
	JE MATHS	-	<sub>JE MATHS</sub>
	(c) $-\frac{\sqrt{3}}{3}$	(d) -3	
		JE MATHS	
	JE MATHS		JE MATHS
9.	Find the angle of inclination, to the (a) $A(3, 7)$ and $B(7, 12)$	e nearest degree, of the following (b) A(-4, 3) and (5,	
		JE MATHS	
	JE MATHS		
	(c) A(-3, -1) and B(-5, -6)	(d) A(2, -13) and (-	11, -4)
	JE MATHS	JE MATHS	JE MATHS
		energy and the second s	

## **Foundation stage 3:**

1. Find the x-intercept and y-intercept of the following lines:

(a) 
$$y = 3x - 4$$

(b) 
$$2x-5y+10=0$$

(d) -3 = 5y + 2x

JE MATHS JE MATHS



(c) 
$$3x+4y=12$$





- 2. Use the gradient intercept form y = mx + c to find the equation of the line with:
  - (a) gradient 5 and y-intercept (0, 3).
- (b) gradient -2/5 and cuts y-axis at -7.

- JE MATHS
- 3. (a) Find the gradient of the following lines by first changing into the gradient intercept form:

-- JE MATHS

(i) 
$$y = 3x - 4$$

(ii) 
$$2x-5y+10=0$$

JE MATHS



(iii) 
$$3x + 4y = 12$$

(iv) 
$$-3=5y+2x$$

(b) Hence, find the angle of inclination, to the nearest degree, of the following lines by using the formula  $m = \tan \alpha$ :

JB MATHS

(i) 
$$y = 3x - 4$$

(ii) 
$$2x-5y+10=0$$

(iii) 3x + 4y = 12

(iv) 
$$-3 = 5y + 2x$$



4. Use the gradient-point form  $y - y_1 = m(x - x_1)$ , to find the equation of a line given gradient and one point: (rearrange into the general form: ax + by + c = 0)

(b) gradient  $-\frac{2}{5}$  and passes through (-3, 2).

JE MATHS

JE MATHS

5. Find the equation of a line, in the gradient-point form,

(a) parallel to y=3x-2 and though (2, 3).

(b) parallel to y = -2x + 5 and though (2, 3).

(c) perpendicular to  $y = \frac{3}{2}x - 5$  and though (2, -3).

JE MATHS

 $y = -\frac{3}{2}x + 5$  and though (-2, -3).

JE MATHS

6. Find the equation of a line given two points: (rearrange into the general form)

(a) (3, 5) and (5, 9)

JE MATHS

(b) (-4, 4) and (5, -8)

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7. Given that a lines l passes two points A(-2, 7) and B(-8, 3), find the equation of a line that is perpendicular to l and passes C(-3, 3).

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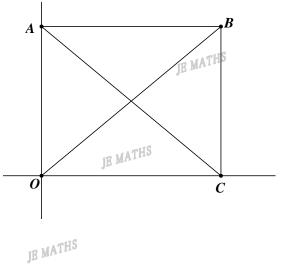
# **Foundation stage 4:**

- 1. Given that O(0, 0), A(0, a), B(b, a) and C(b, 0) form a rectangle.
  - (a) Find OA, AB, BC and CO in terms of letters.



JE MATHS

(b) Find the length of OB and AC in terms of letters.



(c) Hence, show that the diagonals of a rectangle are equal.

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2. Given that O(0, 0), A(a, b) and B(a, 0) form a right-angled triangle.

(a) Find C as the midpoint of AO. JB MA

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(b) Show that CO = CA = CB by using the distance formula.

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(c) Hence, show that the midpoint of the hypotenuse of a right-angled triangle is the centre of a IE MATHS IE MATHS circle through all three vertice.

#### **Foundation stage 1:**

$$x = (3+7)/2 = 5$$
  
 $y = (7+12)/2 = 9.5$   
 $(5, 9.5)$ 

(b)  

$$x = (-4+5)/2 = 0.5$$
  
 $y = (3-8)/2 = -2.5$   
 $(0.5, -2.5)$ 

(c) JE MATHS

$$x = (-3-5)/2 = -4$$
  
 $y = (-1-6)/2 = -3.5$   
 $(-4, -3.5)$ 

THS (d) 
$$y = (2-11)/2 = -4.5$$
  $y = (-13-4)/2 = -8.5$ 

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$$AB = \sqrt{(3-7)^2+(7-12)^2}$$

$$= \sqrt{(4^2+5^2)}$$

$$= \sqrt{41}$$

(b)

(-4.5, -8.5)

AB = 
$$\sqrt{[(-4-5)]^2+(3-8)]^2}$$
  
=  $\sqrt{(9]^2+11]^2}$   
=  $\sqrt{202}$   
JB MATHS

(c)

AB = 
$$\sqrt{(-3-5)^2 + (7-12)^2}$$
  
=  $\sqrt{(2^2+5^2)}$   
=  $\sqrt{29}$ 

(d)

AB = 
$$\sqrt{[(2-11) + (-13-4)]}$$
  
=  $\sqrt{(13 + 9)}$   
=  $\sqrt{250}$   
=  $5\sqrt{10}$ 

3. C(x, y), where x = (-2-5)/2 = -3.5, y = (7-3)/2 = 2

$$C(-3.5, 2)_{THS}$$

AC = 
$$\sqrt{[(-2-3.5)^2+(7-2)^2]} = \sqrt{(9/4+25)} = \sqrt{109/4}$$
  
BC =  $\sqrt{[(-5-3.5)^2+(-3-2)^2]} = \sqrt{(9/4+25)} = \sqrt{109/4}$ 

ans: AC = BC.

JE MATHS

4. AB =  $\sqrt{(1^2+4^2)} = \sqrt{17}$ 

BC = 
$$\sqrt{(4^2+1^2)} = \sqrt{17}$$

$$AC = \sqrt{(5^2 + 5^2)} = 5\sqrt{2}$$

 $AB = BC \neq AC$ 

ans:  $\Delta$  ABC is an isosceles triangle

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5. (a)  $AB = \sqrt{(9^2+12^2)} = \sqrt{225} = 15$ BC =  $\sqrt{(16^2+12^2)} = \sqrt{400} = 20$  $AC = \sqrt{(25^2 + 0^2)} = \sqrt{625} = 25$  $AB^{2}+BC^{2}=15^{2}+20^{2}=625=25^{2}=AC^{2}$ ans:  $\Delta$  ABC is a right-angled triangle JE MATHS JE MATHS (b) AC is the hypotenuse ans: ∠B is 90° JE MATHS JE MATHS (c) D(x, y), where x = (-5+20)/2 = 7.5, y = -6D(7.5, -6)JE MATHS (d)  $AD = \sqrt{(-5-7.5)^2+0^2} = 12.5$ JE MATHS  $CD = \sqrt{(20-7.5)} + 0 = 12.5$ BD =  $\sqrt{(4-7.5)^2+(6-6)^2}$  =  $\sqrt{(625/4)}$  = 12.5 ans: AD = CD = BDJE MATHS JE MATHS JE MATHS JE MATHS JE MATHS JE MATHS

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### **Foundation stage 2:**

1. (a)

$$m = (12-7)/(7-3)$$
$$= 5/4$$

(b)

$$m = (-8-3)/(5--4)$$
$$= -11/9$$
$$= -11/9$$

(c) JE MATHS

$$m = (-6-1)/(-5-3)$$

$$= -5/-2$$

$$= 5/2$$

JE MATHS

(d)  

$$m = (-4--13)/(-11-2)$$
  
 $= -9/13$ 

(e)

$$m = 0/25$$
$$= 0$$

(f)  

$$m = (-20-6)/0$$
  
= undefined

2. (a)

3

(b)

JE MATHS

JE MATHS

JE MATHS (c)

3/4

(d) -21/3

-5/3

3. (a)

-1/3

IB MATHS

-4/3

(c) JE MATHS

3/5

(d) 3/7 JE MATHS

JE MATHS

4.  $m_{AB} = (-4--5)/(1--1) = 1/2$  <sub>IE MATHS</sub>  $m_{BC} = (-6--4)/(11-1) = -2/10 = -1/5$ 

$$m_{CD} = (-7--6)/(9-11) = -1/-2 = 1/2$$

$$m_{DA} = (-7--5)/(9--1) = -2/10 = -1/5$$

 $m_{AB} = m_{CD}$  and  $m_{BC} = m_{DA}$ 

AB||CD and BC||DA

ans: ABCD is a parallelogram

JE MATHS

5.  $m_{AB} = (6--6)/(4--5) = 12/9 = 4/3$ 

$$m_{BC} = (-6-6)/(20-4) = -12/16 = -3/4$$

$$m_{CA} = (-6--6)/(20--5) = 0$$

 $m_{AB} \times m_{BC} = 4/3 \times -3/4 = -1$ AB $\perp$ BCATHS

∠B is a right angle

ans:  $\triangle$  ABC is a right-angled triangle

11

6. (a)

$$m_{AB} = (1-2)/(-2-2) = -1/-4 = 1/4$$

$$m_{BC} = (-3-1)/(-1--2) = -4/1 = -4$$

$$m_{CD} = (-2--3)/(3--1) = -1/4$$

$$m_{DA} = (-2-2)/(3-2) = -4/1 = -4$$

$$m_{AB} = m_{CD}$$
 and  $m_{BC} = m_{DA}$ 

AB||CD and BC||DA

ABCD is a parallelogram

$$m_{AB} \times m_{BC} = 1/4 \times -4 = -1$$

 $AB \bot BC$ 

∠B is a right angle

ans: ABCD is a rectangle

JE MATHS

(b)

$$AB = \sqrt{(4^2+1^2)} = \sqrt{17}$$

BC = 
$$\sqrt{(1^2+4^2)} = \sqrt{17}$$

$$CD = \sqrt{(4^2+1^2)} = \sqrt{17}$$

$$DA = \sqrt{(1^2+4^2)} = \sqrt{17}$$

$$AB = BC = CD = DA$$

ans: ABCD is a square

JE MATHS

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JE MATHS

7. (a)

 $m = \tan 25^{\circ} = 0.47$ 

(c) JE MATHS

 $m = \tan 135^{\circ} = -1$ 

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JE MATHS

 $m = \tan 72.5$  °= 3.17

(d)

JE MATHS

JE MATHS

 $m = \tan 102^{\circ}53' = -4.37$ 

8. (a)

 $\tan \alpha = 1$ 

 $\alpha = 45^{\circ}$ 

JE MATHS

(b)

 $\tan \alpha = \sqrt{3}$ 

 $\alpha = 60^{\circ}$ 

(c)

 $\tan \alpha = -\sqrt{3/3}$ 

 $\alpha = -30^{\circ}$ 

 $= -30^{\circ} + 180^{\circ} = 150^{\circ}$ 

(d)

 $\tan \alpha = -3$  JB MATHS

 $\alpha = -72^{\circ}$ 

= -72  $^{\circ}$ + 180  $^{\circ}$ = 108  $^{\circ}$ 

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				JE.M
			(b) m = (-8-3)/(54) = -11/9 = -11/9 $-11/9 = \tan \alpha$ $\alpha_{1S} = -51^{\circ}$ $= -51^{\circ} + 180^{\circ} = 129^{\circ}$	je maths
(c) m = (-61)/(-52) = -5/-2 = 5/2 $5/2 = \tan \alpha$ $\alpha = 68^{\circ}$	3)	JE MATHS	(d) m = (-4-13)/(-11-2) = -9/13 $-9/13 = \tan \alpha$ $\alpha = -35^{\circ}$ $= -35^{\circ} + 180^{\circ} = 145^{\circ}$	
	JE MATHS			je maths
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		JE MATHS		
			JE MATHS	
	JE MATHS			
	= 5/4 $5/4 = \tan \alpha$ $\alpha = 51^{\circ}$ $BMATHS$ (c) $m = (-61)/(-5\frac{1}{2})$ $5/2 = \tan \alpha$ $\alpha = 68^{\circ}$	m = $(12-7)/(7-3)$ = $5/4$ $5/4 = \tan \alpha$ $\alpha = 51^{\circ}$ JB MATHS (c) m = $(-61)/(-53)$ = $-5/-2$ = $5/2$ $5/2 = \tan \alpha$ $\alpha = 68^{\circ}$	$m = (12-7)/(7-3) = 5/4$ $5/4 = \tan \alpha$ $\alpha = 51^{\circ}_{JB MATHS}$ (c) $m = (-61)/(-53) = -5/-2 = 5/2$ $5/2 = \tan \alpha$ $\alpha = 68^{\circ}$ JE MATHS  JE MATHS	

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# **Foundation stage 3:**

1. (a)

x-int: (4/3, 0)

y-int: (0, -4)

(c)

x-int: (4, 0)

y-int: (0, 3)

2. (a)

y = 5x + 3

JE MATHS

JE MATHS

y-int: (0, -3/5)

JE MA'(d)

(b)

(b)

x-int: (-5, 0)y-int: (0, 2)

y = -2x/5 - 7

x-int: (-3/2, 0)

JE MATHS

JE MATHS

3. (a)

(i)

m = 3

JE MATHS

(iii)

4y = -3x + 12

y = -3x/4 + 3

m = -3/4

(b)

JE MATHS (i)

 $\tan \alpha = 3$ 

 $\alpha = 72^{\circ}$ 

(iii)

 $\tan \alpha = -3/4$ 

 $\alpha = -37^{\circ}$ 

= -37 °+ 180 °= 143 °

4. (a)

JE MATHS y-5=3(x-2)

y-5=3x-6

3x-y-1=0

5. (a) JE MATHS

m = 3, (2, 3)

y-3 = 3(x-2)

(c)

m = -2/3, (2, -3)

 $y+3 = -2/3 \times (x-2)$ 

(ii)

 $5y = 2x + 10_{\text{THS}}$ 

y = 2x/5 + 2

m = 2/5

(iv)

5y = -2x - 3

y = -2x/5 - 3/5

m = -2/5

(ii)

 $\tan \alpha = 2/5$ 

 $\alpha = 22^{\circ}$ 

(iv)

 $\tan \alpha = -2/5$ 

 $\alpha = -22^{\circ}$ 

= -22 °+ 180 °= 158 °

(b)

 $y-2 = -2/5 \times (x+3)$ 

5y-10 = -2x - 6

2x+5y=4

2x+5y-4=0

IB MA (b)

m = -2, (-2, 3)

y-3 = -2(x+2)

(d)

m = 2/3, (-2, -3)

 $y+3 = 2/3 \times (x+2)$ 

JE.Maths

6. (a) m = 4/2 = 2 y-5 = 2(x-3)y-5 = 2x-6

y-3 - 2x-02x-y-1 = 0

7.  $m_{AB} \stackrel{\text{JE MATHS}}{=} (3-7)/(-8-2) = -4/-6 = 2/3$ m = -3/2, (-3, 3)

 $y-3 = -3/2 \times (x+3)$ 

2y-6 = -3x-9

3x+2y+3=0

JE MATHS

(b)

m = -12/9 = -4/3

 $y-4 = -4/3 \times (x+4)$ 

3y-12 = -4x-16

4x+3y+4=0

JE MATHS

### **Foundation stage 4:**

1. (a)

$$OA = \sqrt{(0+a^2)} = a$$
  
 $AB = \sqrt{(b^2+0)} = b$ 

$$BC = \sqrt{(0+a^2)} = a$$

$$CO = \sqrt{(b^2 + 0)} = b$$

JE MATHS

JE MATHS

(b)

$$OB = \sqrt{(b^2 + a^2)}$$

$$AC = \sqrt{(b^2 + a^2)}$$

JE MATHS

JE MATHS

(c)

Since OB = AC

ans: the diagonals of a rectangle are equal

2. (a)

JE MATHS

$$C(x, y)$$
, where  $x = (a+0)/2 = a/2$ ,  $y = (b+0)/2 = b/2$ 

C(a/2, b/2) IB MATHS

JE MATHS

(b)

$$CO = \sqrt{[(a/2-0)^2+(b/2-0)^2]} = \sqrt{(a^2/4+b^2/4)} = \sqrt{[(a^2+b^2)/4]} = \frac{1}{2} \times \sqrt{(a^2+b^2)}$$

CA = 
$$\sqrt{(a-a/2)^2+(b-b/2)^2}$$
 =  $\sqrt{(a^2/4+b^2/4)}$  =  $\sqrt{(a^2+b^2)/4}$  =  $\frac{1}{2} \times \sqrt{(a^2+b^2)}$ 

CB = 
$$\sqrt{(a-a/2)^2+(0-b/2)^2}$$
 =  $\sqrt{(a^2/4+b^2/4)}$  =  $\sqrt{(a^2+b^2)/4}$  =  $\frac{1}{2} \times \sqrt{(a^2+b^2)}$ 

$$CO = \underset{\mathbb{J}\mathbb{B}}{CA} - \underset{\mathbb{T}H}{-} CB$$

JE MATHS

(c)

since CO = CA = CB

then C is the center of a circle which go through A, B and C, as three vertices of this  $Rt\Delta$ 

JE MATHS

JE MATHS

JE MATHS

JE MATHS