

St Line Multiple Choice Ex

1. What is the distance, in units, between the points $(-1, 2)$ and $(4, 5)$?

- A. $\sqrt{8}$
- B. $\sqrt{16}$
- C. $\sqrt{34}$
- D. $\sqrt{58}$

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
C	1.1	C	0.64	0.5	NC	G1	HSN 054

The distance is $\sqrt{(4 - (-1))^2 + (5 - 2)^2}$

$$= \sqrt{5^2 + 3^2}$$

$$= \sqrt{25 + 9}$$

$$= \sqrt{34}.$$

Option C

2. What is the distance, in units, between the points (a, b) and $(-b, a)$?

- A. $\sqrt{2}\sqrt{a^2 + b^2}$
- B. $\sqrt{2}(a + b)$
- C. $\sqrt{2}(\sqrt{a} + \sqrt{b})$
- D. $2\sqrt{a^2 + b^2}$

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
A	1.1	C	0.3	0.23	CN	G1	HSN 011

$$d^2 = (a - (-b))^2 + (b - a)^2$$

$$= (a + b)^2 + (b - a)^2$$

$$= a^2 + 2ab + b^2 + b^2 - 2ab + a^2$$

$$= 2a^2 + 2b^2$$

$$= 2(a^2 + b^2)$$

$$d = \sqrt{2(a^2 + b^2)} \quad \text{since } d \geq 0$$

$$= \sqrt{2}\sqrt{a^2 + b^2}.$$

Remember:
 $d^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$

Option A

3. The line through the points $(-2, 5)$ and $(7, a)$ has gradient 3.

What is the value of a ?

- A. 8
B. 22
C. 28
D. 32

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
D	1.1	C	0.58	0.16	NC	G2	HSN 05

$$m = \frac{a-5}{7-(-2)} = \frac{a-5}{9} = 3.$$

So $a-5 = 27$
 $a = 32$

Option D

4. The equation of a line is $3y = ax + 1$ where $a \neq 0$ is a constant.

Given that the line has a gradient of $\frac{7}{5}$, what is the value of a ?

- A. $-\frac{21}{5}$
B. $-\frac{7}{5}$
C. $\frac{7}{5}$
D. $\frac{21}{5}$

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
D	1.1	C	0.5	0.64	NC	G2, G4	HSN 162

$$3y = ax + 1$$

$$y = \frac{a}{3}x + \frac{1}{3}. \quad \text{So } m = \frac{a}{3}.$$

Compare to $y = mx + c$

$$\frac{a}{3} = \frac{7}{5}$$

$$a = \frac{21}{5}$$

Option D

5. The line with equation $y = ax + 4$ is perpendicular to the line with equation $3x + y + 1 = 0$.

What is the value of a ?

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

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
C	1.1	C	0.7	0.62	NC	G2, G5	HSN 089

$3x + y + 1 = 0$
 $y = -3x - 1$. So $m_1 = -3$. Compare to $y = mx + c$

The line $y = ax + 4$ has gradient $m_2 = a$

Since the lines are perpendicular, $m_1 \times m_2 = -1$, ie

$$-3a = -1$$

$$a = \frac{1}{3}$$

Option C

6. The line with equation $y = -\frac{3}{a}x + 4$, where $a \neq 0$ is a constant, is perpendicular to the line with equation $y = \frac{1}{2}x + 1$.

What is the value of a ?

- A. -6
 B. $-\frac{3}{2}$
 C. $\frac{3}{2}$
 D. 6

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
C	1.1	C	0.53	0.41	NC	G2, G5	HSN 151

The gradient of $y = -\frac{3}{a}x + 4$ is $-\frac{3}{a}$.
 The gradient of $y = \frac{1}{2}x + 1$ is $\frac{1}{2}$.

So $-\frac{3}{a} \times \frac{1}{2} = -1$ since the lines are perpendicular.

$$3 = 2a$$

$$a = \frac{3}{2}$$

Option C

Comparing to $y = mx + c$.

7. The line l passes through $(3, -2)$ and is parallel to the line with equation $y = \frac{1}{2}x + 5$.

What is the equation of l ?

- A. $x - 2y + 1 = 0$
 B. $x - 2y - 7 = 0$
 C. $x - 2y + 7 = 0$
 D. $x - 2y - 5 = 0$

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
B	1.1	C	0.57	0.39	CN	G3	HSN 06

The line $y = \frac{1}{2}x + 5$ has gradient $\frac{1}{2}$. Compare to
 $y = mx + c$

$$y - (-2) = \frac{1}{2}(x - 3)$$

$$2y + 4 = x - 3$$

$$x - 2y - 7 = 0.$$

Option B

8. Find the equation of the line passing through $(6, -4)$ and parallel to the line with equation $2x - 3y - 1 = 0$.
- A. $2x - 3y - 24 = 0$
- B. $3x + 2y - 10 = 0$
- C. $2x - y - 16 = 0$
- D. $2x - 3y - 18 = 0$

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
A	1.1	C	0.63	0.33	NC	G3, G2	HSN 158

Method 1 The equation has the form $2x - 3y + c = 0$

and passes through $(6, -4)$.

$$\text{So } 2 \times 6 - 3 \times (-4) + c = 0$$

$$12 + 12 + c = 0$$

$$c = -24.$$

Method 2 $2x - 3y - 1 = 0 \Leftrightarrow 3y = 2x - 1$

$$\Leftrightarrow y = \frac{2}{3}x - \frac{1}{3}.$$

So the gradient is $\frac{2}{3}$.

$$y + 4 = \frac{2}{3}(x - 6)$$

$$3y + 12 = 2x - 12$$

$$2x - 3y - 24 = 0$$

Comparing to
 $y = mx + c$

Option A

9. A straight line has equation $y = -x + 4$.

What angle does the line make with the positive direction of the x -axis?

- A. 45°
- B. 120°
- C. 135°
- D. 150°

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
C	1.1	C	0.53	0.65	NC	G4	HSN 161

$m = -1$

Compare to $y = mx + c$

$\tan \theta = -1$

Using $m = \tan \theta$

$\theta = \tan^{-1}(-1)$

$= 180 - \tan^{-1}(1)$

$= 180 - 45$

$= 135$

Option C

10. Given that $(1, 0)$ is the midpoint of $A(-3, a)$ and $B(b, 2)$, what are the values of a and b ?

	a	b
A.	-2	4
B.	-2	5
C.	2	-5
D.	4	-2

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
B	1.1	C	0.82	0.43	NC	G6	HSN 079

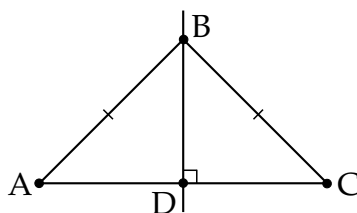
$$\text{midpoint}_{AB} = \left(\frac{b-3}{2}, \frac{2+a}{2} \right) = (1, 0).$$

So $\frac{b-3}{2} = 1$ and $\frac{2+a}{2} = 0$

$b-3 = 2$ $2+a = 0$

$b = 5$ $a = -2.$ Option 6

11. Triangle ABC is shown below.



Here are two statements about the line BD:

- I. BD is an altitude of triangle ABC
- II. BD is the perpendicular bisector of AC

Which of the following is true?

- A. neither statement is correct
- B. only statement I is correct
- C. only statement II is correct
- D. both statements are correct

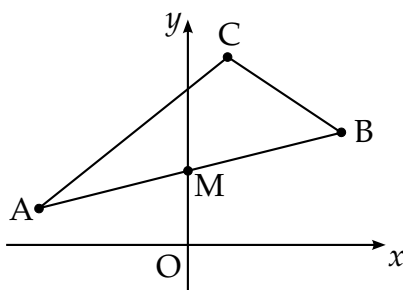
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Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
D	1.1	C	0.74	0.37	NC	G7	HSN 068

I is correct since the line passes through vertex B and is perpendicular to the opposite side.

II is correct since the triangle is isosceles. Option D

12. Triangle ABC with vertices $A(-4, 1)$, $B(4, 3)$ and $C(1, 5)$ is shown below.



Point $M(0, 2)$ is the midpoint of AB . What is the equation of the median through C ?

- A. $3x - y + 2 = 0$
- B. $x - 4y + 8 = 0$
- C. $4x + y - 2 = 0$
- D. $3x - y - 1 = 0$

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
A	1.1	C	0.78	0.38	CN	G7	HSN 138

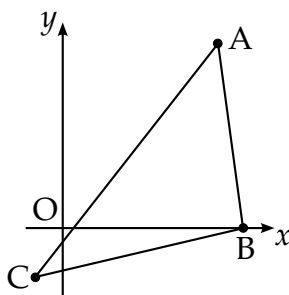
$$m_{MC} = \frac{5-2}{1-0} = 3.$$

So the equation is $y - 2 = 3(x - 0)$

i.e. $3x - y + 2 = 0.$

Option A

13. Triangle ABC with vertices $A(6,7)$, $B(7,0)$ and $C(-1,-2)$ is shown below.



The line through C and B has gradient $\frac{1}{4}$. Find the equation of the altitude through A.

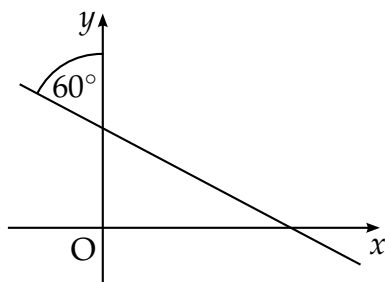
- A. $4x + y - 11 = 0$
- B. $x - 4y + 22 = 0$
- C. $4x + y - 31 = 0$
- D. $8x - 3y - 27 = 0$

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
C	1.1	C	0.55	0.67	CN	G7, G5	HSN 128

$m_{alt.} = -4$ since $m_{BC} \times m_{alt} = -1$
 Using $m_{alt.}$ and $A(6,7)$: $y - 7 = -4(x - 6)$
 $y - 7 = -4x + 24$
 $4x + y - 31 = 0.$ Option C

14. What is the gradient of the straight line shown in the diagram?



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

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
C	1.2	C	0.49	0.33	NC	G2, T3	HSN 147

$m = \tan 150^\circ$
 $= -\tan 30^\circ$
 $= -\frac{1}{\sqrt{3}}$

Option C

15. A line makes an angle of 60° with the positive direction of the x -axis.

What is the gradient of the line?

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

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
A	1.2	C	0.53	0.15	NC	G2, T3	HSN 03

$m = \tan 60^\circ$ $= \sqrt{3}$	Remember: $m = \tan \theta$	Option <input type="checkbox"/> A
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[END OF QUESTIONS]