

## Geometry Non Calculator C Grade

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

- I. The length of  $ST = 5$  units;
- II. The gradient of  $ST = \frac{4}{3}$ .

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

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
B	1.1	C	0	0	NC	G1, G2	2009 P1 Q5

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

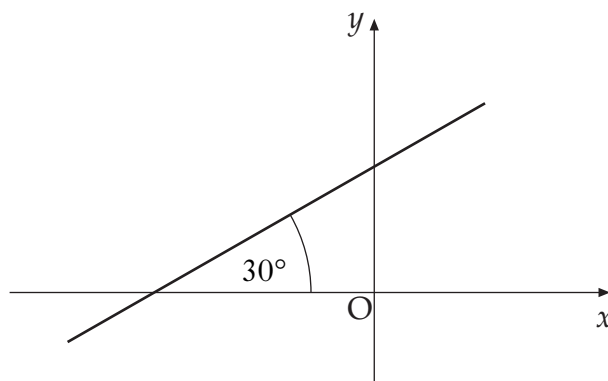
What is the gradient of any line parallel to  $l$ ?

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

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
B	1.1	C	0	0	NC	G2	2011 P1 Q2

3. A line makes an angle of  $30^\circ$  with the positive direction of the  $x$ -axis as shown.



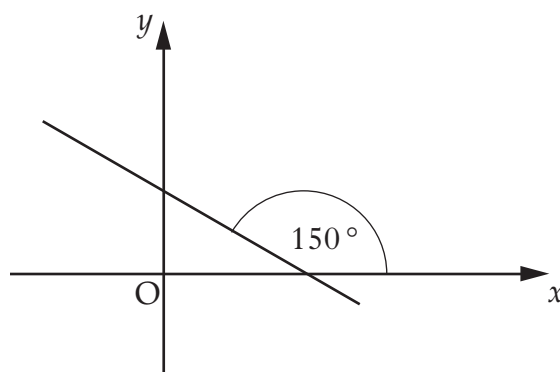
What is the gradient of the line?

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

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
A	1.1	C	0	0	NC	G2	2011 P1 Q8

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



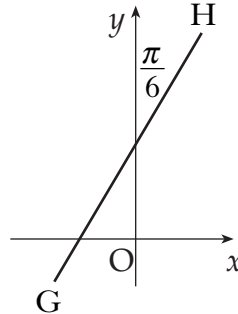
- A.  $-\sqrt{3}$
- B.  $-\frac{1}{\sqrt{3}}$
- C.  $-\frac{1}{2}$
- D.  $-\frac{\sqrt{3}}{2}$

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
B	1.1	C	0	0	NC	G2	2012 P1 Q4

5. 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?

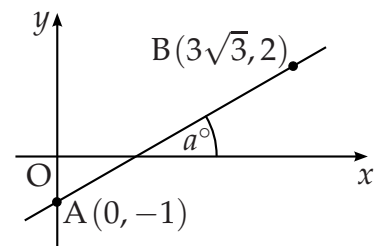


- A.  $\sqrt{3}$
- B.  $\frac{1}{2}$
- C.  $\frac{1}{\sqrt{2}}$
- D.  $\frac{\sqrt{3}}{2}$

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
A	1.1	C	0	0	NC	G2	2009 P1 Q15

[SQA] 6. Find the size of the angle  $a^\circ$  that the line joining the points  $A(0, -1)$  and  $B(3\sqrt{3}, 2)$  makes with the positive direction of the  $x$ -axis.



3

Part	Marks	Level	Calc.	Content	Answer	U1 OC1
	3	C	NC	G2	30	2000 P1 Q3

<ul style="list-style-type: none"> <li>•<sup>1</sup> ss: know how to find gradient or equ.</li> <li>•<sup>2</sup> pd: process</li> <li>•<sup>3</sup> ic: interpret exact value</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>\frac{2-(-1)}{3\sqrt{3}-0}</math></li> <li>•<sup>2</sup> <math>\tan a = \text{gradient}</math> stated or implied by</li> <li>•<sup>3</sup> <math>a = 30</math></li> </ul>
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7. A line L is perpendicular to the line with equation  $2x - 3y - 6 = 0$ .

What is the gradient of the line L?

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

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
A	1.1	C	0	0	CN	G2, G5	2010 P1 Q1

8. 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?

- A. -2
- B.  $-\frac{7}{4}$
- C. 1
- D.  $\frac{7}{4}$

2

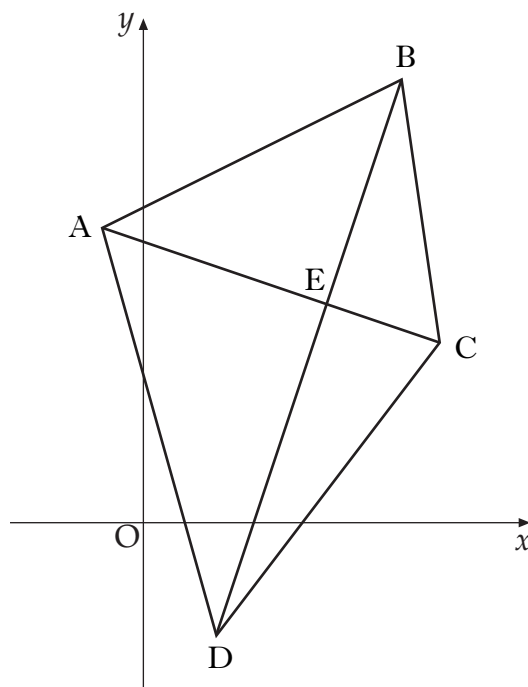
Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
D	1.1	C	0	0	NC	G2, G7	2009 P1 Q3

- [SQA] 9. Find the equation of the straight line which is parallel to the line with equation  $2x + 3y = 5$  and which passes through the point  $(2, -1)$ .

3

Part	Marks	Level	Calc.	Content	Answer	U1 OC1
	3	C	CN	G3, G2	$2x + 3y = 1$	2001 P1 Q1
<ul style="list-style-type: none"> <li>•<sup>1</sup> ss: express in standard form</li> <li>•<sup>2</sup> ic: interpret gradient</li> <li>•<sup>3</sup> ic: state equation of straight line</li> </ul>				<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>y = -\frac{2}{3}x + \frac{5}{3}</math> stated or implied by •<sup>2</sup></li> <li>•<sup>2</sup> <math>m_{\text{line}} = -\frac{2}{3}</math> stated or implied by •<sup>3</sup></li> <li>•<sup>3</sup> <math>y - (-1) = -\frac{2}{3}(x - 2)</math></li> </ul>		

- [SQA] 10. A quadrilateral has vertices  $A(-1, 8)$ ,  $B(7, 12)$ ,  $C(8, 5)$  and  $D(2, -3)$  as shown in the diagram.



- (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

Part	Marks	Level	Calc.	Content	Answer	U1 OC1
(a)	2	C	CN	G3, G2	$y - 12 = 3(x - 7)$	2011 P1 Q21
(b)	3	C	CN	G8	E(5, 6)	
(ci)	4	C	CN	G7	$y - 10 = -2(x - 3)$	
(cii)	1	C	CN	A6	proof	

- <sup>1</sup> pd: find gradient of BD
- <sup>2</sup> ic: state equation of BD

- <sup>3</sup> ss: start solution of simultaneous eqs
- <sup>4</sup> pd: solve for one variable
- <sup>5</sup> pd: solve for second variable

- <sup>6</sup> ss: know and find midpoint of AB
- <sup>7</sup> pd: find gradient of AB
- <sup>8</sup> ic: interpret perpendicular gradient
- <sup>9</sup> ic: state equation of perp. bisector
- <sup>10</sup> ic: justification of point on line

- <sup>1</sup>  $\frac{15}{5}$  or equiv.

- <sup>2</sup>  $y - (-3) = 3(x - 2)$

- <sup>3</sup>  $3x - y = 9$  and  $x + 3y = 23$

- <sup>4</sup>  $x = 5$  or  $y = 6$

- <sup>5</sup>  $y = 6$  or  $x = 5$

- <sup>6</sup> (3, 10)

- <sup>7</sup>  $\frac{4}{8}$  or equiv.

- <sup>8</sup>  $-\frac{8}{4}$  or equiv

- <sup>9</sup>  $y - 10 = -2(x - 3)$

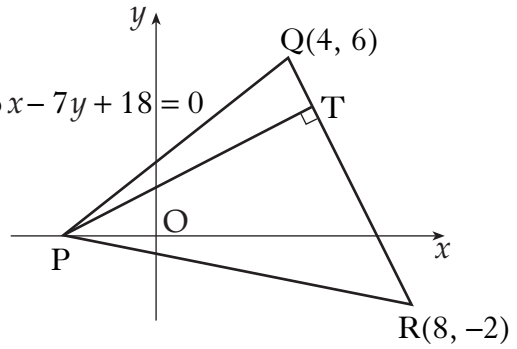
- <sup>10</sup> when  $x = 5$ ,  $y = -2 \times 5 + 16 = 6$

Questions marked '[SQA]' © SQA

[SQA] 11. 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

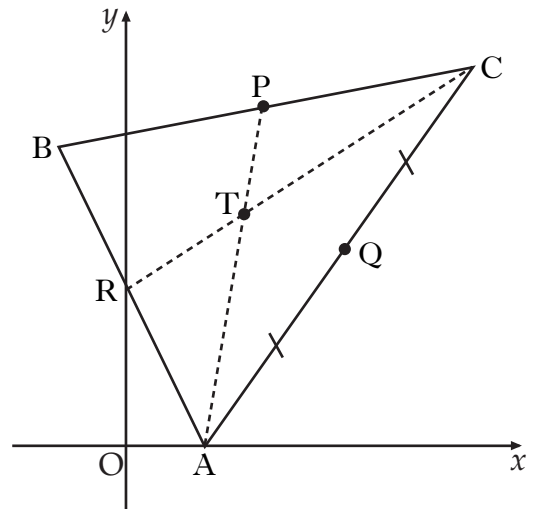
Part	Marks	Level	Calc.	Content	Answer	U1 OC1
(a)	1	C	CN	G4	$P(-3, 0)$	2009 P1 Q21
(b)	3	C	CN	G7	$y = \frac{1}{2}(x + 3)$	
(c)	4	C	CN	G8	$T(5, 4)$	

<ul style="list-style-type: none"> <li>•<sup>1</sup> ic: interpret <math>x</math>-intercept</li> <li>•<sup>2</sup> pd: find gradient (of QR)</li> <li>•<sup>3</sup> ss: know and use <math>m_1 m_2 = -1</math></li> <li>•<sup>4</sup> ic: state equ. of altitude</li> <li>•<sup>5</sup> ic: state equ. of line (QR)</li> <li>•<sup>6</sup> ss: prepare to solve sim. equ.</li> <li>•<sup>7</sup> pd: solve for <math>x</math></li> <li>•<sup>8</sup> pd: solve for <math>y</math></li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>P = (-3, 0)</math></li> <li>•<sup>2</sup> <math>m_{QR} = -2</math></li> <li>•<sup>3</sup> <math>m_{\text{alt.}} = \frac{1}{2}</math></li> <li>•<sup>4</sup> <math>y - 0 = \frac{1}{2}(x + 3)</math></li> <li>•<sup>5</sup> <math>y + 2 = -2(x - 8)</math></li> <li>•<sup>6</sup> <math>x - 2y = -3</math> and <math>2x + y = 14</math></li> <li>•<sup>7</sup> <math>x = 5</math></li> <li>•<sup>8</sup> <math>y = 4</math></li> </ul>
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12. 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  $T(6,12)$ .

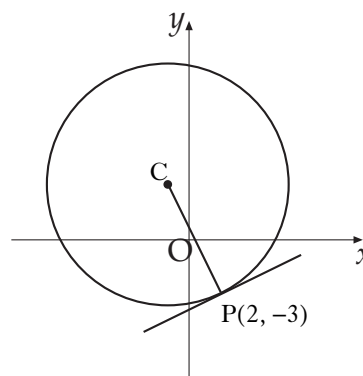


- (a) Find the equation of median BQ. 3
- (b) Verify that T lies on BQ. 1
- (c) Find the ratio in which T divides BQ. 2

Part	Marks	Level	Calc.	Content	Answer	U3 OC1
(a)	3	C	CN	G7	$y - 16 = -\frac{2}{5}(x - (-4))$	2010 P1 Q21
(b)	1	C	CN	A6	proof	
(c)	2	C	CN	G24	2 : 1	

<ul style="list-style-type: none"> <li>•<sup>1</sup> ss: know and find midpoint of AC</li> <li>•<sup>2</sup> pd: calculate gradient of BQ</li> <li>•<sup>3</sup> ic: state equation</li>   <li>•<sup>4</sup> ic: substitute in for T and complete</li>   <li>•<sup>5</sup> ss: valid method for finding the ratio</li> <li>•<sup>6</sup> ic: complete to simplified ratio</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>(11, 10)</math></li> <li>•<sup>2</sup> <math>-\frac{6}{15}</math> or equiv</li> <li>•<sup>3</sup> <math>y - 16 = -\frac{2}{5}(x - (-4))</math> or <math>y - 10 = -\frac{2}{5}(x - 11)</math></li>   <li>•<sup>4</sup> <math>2(6) + 5(12) = 12 + 60 = 72</math></li>   <li>•<sup>5</sup> e.g. vector approach <math>\vec{BT} = \begin{pmatrix} 10 \\ -4 \end{pmatrix}, \vec{TQ} = \begin{pmatrix} 5 \\ -2 \end{pmatrix}</math></li> <li>•<sup>6</sup> 2 : 1</li> </ul>
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13. The point  $P(2, -3)$  lies on the circle with centre  $C$  as shown. The gradient of  $CP$  is  $-2$ . What is the equation of the tangent at  $P$ ?



- A.  $y + 3 = -2(x - 2)$
- B.  $y - 3 = -2(x + 2)$
- C.  $y + 3 = \frac{1}{2}(x - 2)$
- D.  $y - 3 = \frac{1}{2}(x + 2)$

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
C	2.4	C	0	0	NC	G11	2011 P1 Q6

- [SQA] 14. The point  $P(2, 3)$  lies on the circle  $(x + 1)^2 + (y - 1)^2 = 13$ . Find the equation of the tangent at  $P$ .

4

Part	Marks	Level	Calc.	Content	Answer	U2 OC4
	4	C	CN	G11	$2y + 3x = 12$	2002 P1 Q1

<ul style="list-style-type: none"> <li>•<sup>1</sup> ic: interpret centre from equ. of circle</li> <li>•<sup>2</sup> ss: know to find gradient of radius</li> <li>•<sup>3</sup> ss: know to find perp. gradient</li> <li>•<sup>4</sup> ic: state equation of tangent</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>C = (-1, 1)</math></li> <li>•<sup>2</sup> <math>m_{\text{rad}} = \frac{2}{3}</math></li> <li>•<sup>3</sup> <math>m_{\text{tgt}} = -\frac{3}{2}</math></li> <li>•<sup>4</sup> <math>y - 3 = -\frac{3}{2}(x - 2)</math></li> </ul>
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15. The line with equation  $y = 2x$  intersects the circle with equation  $x^2 + y^2 = 5$  at the points J and K.

What are the  $x$ -coordinates of J and K?

- A.  $x_J = 1, x_K = -1$   
 B.  $x_J = 2, x_K = -2$   
 C.  $x_J = 1, x_K = -2$   
 D.  $x_J = -1, x_K = 2$

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
A	2.4	C	0	0	NC	G12	2009 P1 Q9

16. A circle has equation  $x^2 + y^2 + 8x + 6y - 75 = 0$ .

What is the radius of the circle?

- A. 5  
 B. 10  
 C.  $\sqrt{75}$   
 D.  $\sqrt{175}$

2

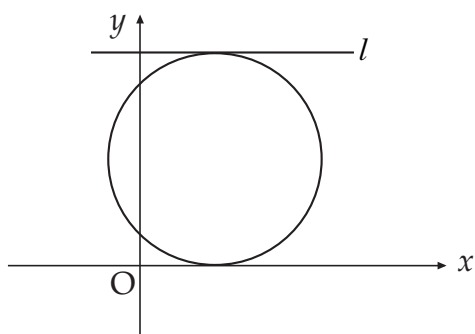
Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
B	2.4	C	0	0	NC	G9	2009 P1 Q2

- [SQA] 17. Circle P has equation  $x^2 + y^2 - 8x - 10y + 9 = 0$ . Circle Q has centre  $(-2, -1)$  and radius  $2\sqrt{2}$ .
- (a) (i) Show that the radius of circle P is  $4\sqrt{2}$ .  
 (ii) Hence show that circles P and Q touch. 4
- (b) Find the equation of the tangent to the circle Q at the point  $(-4, 1)$ . 3
- (c) The tangent in (b) intersects circle P in two points. Find the  $x$ -coordinates of the points of intersection, expressing your answers in the form  $a \pm b\sqrt{3}$ . 3

Part	Marks	Level	Calc.	Content	Answer	U2 OC4
(a)	2	C	CN	G9	proof	2001 P1 Q11
(a)	2	A/B	CN	G14		
(b)	3	C	CN	G11	$y = x + 5$	
(c)	3	C	CN	G12	$x = 2 \pm 2\sqrt{3}$	

<ul style="list-style-type: none"> <li>•<sup>1</sup> ic: interpret centre of circle (P)</li> <li>•<sup>2</sup> ss: find radius of circle (P)</li> <li>•<sup>3</sup> ss: find sum of radii</li> <li>•<sup>4</sup> pd: compare with distance between centres</li>   <li>•<sup>5</sup> ss: find gradient of radius</li> <li>•<sup>6</sup> ss: use <math>m_1 m_2 = -1</math></li> <li>•<sup>7</sup> ic: state equation of tangent</li>   <li>•<sup>8</sup> ss: substitute linear into circle</li> <li>•<sup>9</sup> pd: express in standard form</li> <li>•<sup>10</sup> pd: solve (quadratic) equation</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>C_P = (4, 5)</math></li> <li>•<sup>2</sup> <math>r_P = \sqrt{16 + 25 - 9} = \sqrt{32} = 4\sqrt{2}</math></li> <li>•<sup>3</sup> <math>r_P + r_Q = 4\sqrt{2} + 2\sqrt{2} = 6\sqrt{2}</math></li> <li>•<sup>4</sup> <math>C_P C_Q = \sqrt{6^2 + 6^2} = 6\sqrt{2}</math> and "so touch"</li>   <li>•<sup>5</sup> <math>m_r = -1</math></li> <li>•<sup>6</sup> <math>m_{\text{tgt}} = +1</math></li> <li>•<sup>7</sup> <math>y - 1 = 1(x + 4)</math></li>   <li>•<sup>8</sup> <math>x^2 + (x + 5)^2 - 8x - 10(x + 5) + 9 = 0</math></li> <li>•<sup>9</sup> <math>2x^2 - 8x - 16 = 0</math></li> <li>•<sup>10</sup> <math>x = 2 \pm 2\sqrt{3}</math></li> </ul>
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18. The equation of the circle shown in the diagram is  $x^2 + y^2 - 6x - 10y + 9 = 0$ . The  $x$ -axis and the line  $l$  are parallel tangents to the circle.



What is the equation of line  $l$ ?

- A.  $y = 5$
- B.  $y = 10$
- C.  $y = 18$
- D.  $y = 20$

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
B	2.4	C	0	0	CN	G9, G15	2010 P1 Q8

19. If  $\mathbf{u} = k \begin{pmatrix} 3 \\ -1 \\ 0 \end{pmatrix}$ , where  $k > 0$  and  $\mathbf{u}$  is a unit vector, determine the value of  $k$ .

- A.  $\frac{1}{2}$
- B.  $\frac{1}{8}$
- C.  $\frac{1}{\sqrt{2}}$
- D.  $\frac{1}{\sqrt{10}}$

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
D	3.1	C	0	0	NC	G16, G18	2012 P1 Q15

20. The vector  $\mathbf{u}$  has components  $\begin{pmatrix} -3 \\ 0 \\ 4 \end{pmatrix}$ .

Which of the following is a unit vector parallel to  $\mathbf{u}$ ?

- A.  $-\frac{3}{5}\mathbf{i} + \frac{4}{5}\mathbf{k}$
- B.  $-3\mathbf{i} + 4\mathbf{k}$
- C.  $-\frac{3}{\sqrt{7}}\mathbf{i} + \frac{4}{\sqrt{7}}\mathbf{k}$
- D.  $-\frac{1}{3}\mathbf{i} + \frac{1}{4}\mathbf{k}$

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
A	3.1	C	0	0	NC	G18	2009 P1 Q17

21. Given that  $p = \begin{pmatrix} 2 \\ 5 \\ -7 \end{pmatrix}$ ,  $q = \begin{pmatrix} 1 \\ 0 \\ -1 \end{pmatrix}$  and  $r = \begin{pmatrix} -4 \\ 2 \\ 0 \end{pmatrix}$ , express  $2p - q - \frac{1}{2}r$  in component form.

A.  $\begin{pmatrix} 1 \\ 9 \\ -15 \end{pmatrix}$

B.  $\begin{pmatrix} 1 \\ 11 \\ -13 \end{pmatrix}$

C.  $\begin{pmatrix} 5 \\ 9 \\ -13 \end{pmatrix}$

D.  $\begin{pmatrix} 5 \\ 11 \\ -15 \end{pmatrix}$

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
C	3.1	C	0	0	NC	G20	2011 P1 Q1

22. Given that  $u = \begin{pmatrix} 2 \\ 0 \\ 1 \end{pmatrix}$  and  $v = \begin{pmatrix} -1 \\ 2 \\ 4 \end{pmatrix}$ , find  $3u - 2v$  in component form.

A.  $\begin{pmatrix} 4 \\ -1 \\ -5 \end{pmatrix}$

B.  $\begin{pmatrix} 4 \\ -4 \\ 11 \end{pmatrix}$

C.  $\begin{pmatrix} 8 \\ -1 \\ 5 \end{pmatrix}$

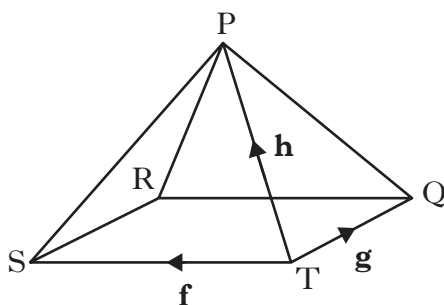
D.  $\begin{pmatrix} 8 \\ -4 \\ -5 \end{pmatrix}$

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
D	3.1	C	0	0	CN	G20	2010 P1 Q3



23. The diagram shows a square-based pyramid P,QRST.  $\vec{TS}$ ,  $\vec{TQ}$  and  $\vec{TP}$  represent  $f$ ,  $g$  and  $h$  respectively.



Express  $\vec{RP}$  in terms of  $f$ ,  $g$  and  $h$ .

- A.  $-f + g - h$
- B.  $-f - g + h$
- C.  $f - g - h$
- D.  $f + g + h$

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
B	3.1	C	0	0	NC	G22, G21	2012 P1 Q10

[SQA] 24. D, E and F have coordinates  $(10, -8, -15)$ ,  $(1, -2, -3)$  and  $(-2, 0, 1)$  respectively.

(a) (i) Show that D, E and F are collinear.

(ii) Find the ratio in which E divides DF.

4

(b) G has coordinates  $(k, 1, 0)$ .

Given that DE is perpendicular to GE, find the value of  $k$ .

4

Part	Marks	Level	Calc.	Content	Answer	U3 OC1
(a)	4	C	CN	G23, G24	3 : 1	2009 P1 Q22
(b)	4	C	CN	G27	$k = 7$	

<ul style="list-style-type: none"> <li>•<sup>1</sup> ss: use vector approach</li> <li>•<sup>2</sup> ic: compare two vectors</li> <li>•<sup>3</sup> ic: complete proof</li> <li>•<sup>4</sup> ic: state ratio</li>   <li>•<sup>5</sup> ss: use vector approach</li> <li>•<sup>6</sup> ss: know scalar product = 0 for <math>\perp</math> vectors</li> <li>•<sup>7</sup> pd: start to solve</li> <li>•<sup>8</sup> pd: complete</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>\vec{DE} = \begin{pmatrix} -9 \\ 6 \\ 12 \end{pmatrix}</math> or <math>\vec{EF} = \begin{pmatrix} -3 \\ 2 \\ 4 \end{pmatrix}</math></li> <li>•<sup>2</sup> 2<sup>nd</sup> column vector and <math>(DE) = 3\vec{EF}</math></li> <li>•<sup>3</sup> <math>\vec{DE}</math> and <math>\vec{EF}</math> have common point and common direction; hence D, E and F are collinear</li> <li>•<sup>4</sup> 3 : 1</li>   <li>•<sup>5</sup> <math>\vec{GE} = \begin{pmatrix} 1-k \\ -3 \\ -3 \end{pmatrix}</math></li> <li>•<sup>6</sup> <math>\vec{DE} \cdot \vec{GE} = 0</math></li> <li>•<sup>7</sup> <math>-9(1-k) + 6 \times (-3) + 12 \times (-3)</math></li> <li>•<sup>8</sup> <math>k = 7</math></li> </ul>
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25. Given that the points  $S(-4, 5, 1)$ ,  $T(-16, -4, 16)$  and  $U(-24, -10, 26)$  are collinear, calculate the ratio in which T divides SU.

A. 2 : 3

B. 3 : 2

C. 2 : 5

D. 3 : 5

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
B	3.1	C	0	0	CN	G24	2011 P1 Q15

- [SQA] 26. The point Q divides the line joining P(-1, -1, 0) to R(5, 2, -3) in the ratio 2 : 1.  
Find the coordinates of Q.

3

Part	Marks	Level	Calc.	Content	Answer	U3 OC1
	3	C	NC	G25	(3, 1, -2)	2002 P1 Q2
<ul style="list-style-type: none"> <li>•<sup>1</sup> pd: find vector components</li> <li>•<sup>2</sup> ss: use parallel vectors</li> <li>•<sup>3</sup> pd: process vectors</li> </ul>				<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>\vec{PR} = \begin{pmatrix} 6 \\ 3 \\ -3 \end{pmatrix}</math></li> <li>•<sup>2</sup> <math>\vec{PQ} = \frac{2}{3}\vec{PR}</math></li> <li>•<sup>3</sup> <math>Q = (3, 1, -2)</math></li> </ul>		

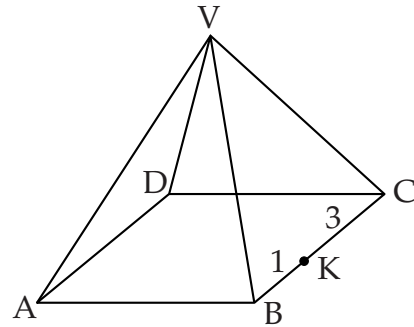
- [SQA] 27. VABCD is a pyramid with a rectangular base ABCD.

Relative to some appropriate axes,

$$\vec{VA} \text{ represents } -7i - 13j - 11k$$

$$\vec{AB} \text{ represents } 6i + 6j - 6k$$

$$\vec{AD} \text{ represents } 8i - 4j + 4k.$$



K divides BC in the ratio 1 : 3.

Find  $\vec{VK}$  in component form.

3

Part	Marks	Level	Calc.	Content	Answer	U3 OC1
	3	C	CN	G25, G21, G20	$\begin{pmatrix} 1 \\ -8 \\ -16 \end{pmatrix}$	2000 P1 Q7
<ul style="list-style-type: none"> <li>•<sup>1</sup> ss: recognise crucial aspect</li> <li>•<sup>2</sup> ic: interpret ratio</li> <li>•<sup>3</sup> pd: process components</li> </ul>				<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>\vec{VK} \equiv \vec{VA} + \vec{AB} + \vec{BK}</math> or <math>\vec{VK} = \vec{VB} + \vec{BK}</math></li> <li>•<sup>2</sup> <math>\vec{BK} = \frac{1}{4}\vec{BC}</math> or <math>\frac{1}{4}\vec{AD}</math> or <math>\begin{pmatrix} 2 \\ -1 \\ 1 \end{pmatrix}</math> or <math>\begin{pmatrix} -1 \\ -7 \\ -17 \end{pmatrix}</math></li> <li>•<sup>3</sup> <math>\vec{VK} = \begin{pmatrix} 1 \\ -8 \\ -16 \end{pmatrix}</math></li> </ul>		

28. If  $u = \begin{pmatrix} -3 \\ 1 \\ 2t \end{pmatrix}$  and  $v = \begin{pmatrix} 1 \\ t \\ -1 \end{pmatrix}$  are perpendicular, what is the value of  $t$ ?

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

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
A	3.1	C	0	0	NC	G27	2012 P1 Q7

29. The vectors  $xi + 5j + 7k$  and  $-3i + 2j - k$  are perpendicular.

What is the value of  $x$ ?

- A.  $0$
- B.  $1$
- C.  $\frac{4}{3}$
- D.  $\frac{10}{3}$

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
B	3.1	C	0	0	CN	G27, G26	2010 P1 Q10

30. Given that  $a = \begin{pmatrix} 3 \\ 4 \\ 0 \end{pmatrix}$  and  $a \cdot (a + b) = 7$ , what is the value of  $a \cdot b$ ?

- A.  $\frac{7}{25}$
- B.  $-\frac{18}{5}$
- C.  $-6$
- D.  $-18$

2

Key	Outcome	Grade	Facility	Disc.	Calculator	Content	Source
D	3.1	C	0	0	NC	G29, G26	2012 P1 Q17

[END OF QUESTIONS]