Name:_____

GCSE (1 - 9) Vector Proof	Solutions:

These questions are compiled from released Pearson Edexcel GCSE maths exam papers

They contain exam questions from up until the ***November 2023*** exam series

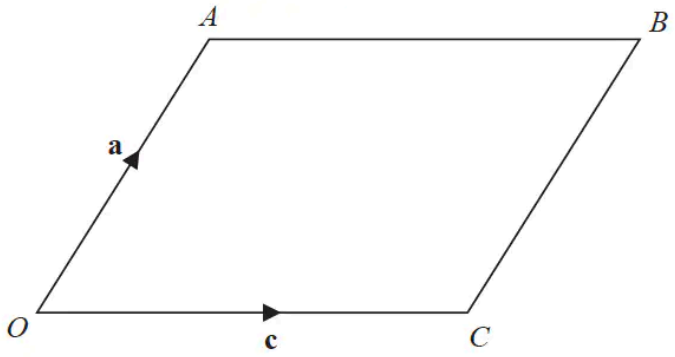
More recent exam papers do exist but are withheld for mock exams

As new exam papers are released these worksheets will gradually be updated

The **most current** version of these worksheets will always be available at: kennethstafford.co.uk

Past Papers:	**Similar Worksheets:**
Solutions:	**This worksheet:**

1



$OABC$ is a parallelogram.

$\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OC} = \mathbf{c}$

X is the midpoint of the line AC.
OCD is a straight line so that $OC : CD = k : 1$

Given that $\overrightarrow{XD} = 3\mathbf{c} - \frac{1}{2}\mathbf{a}$

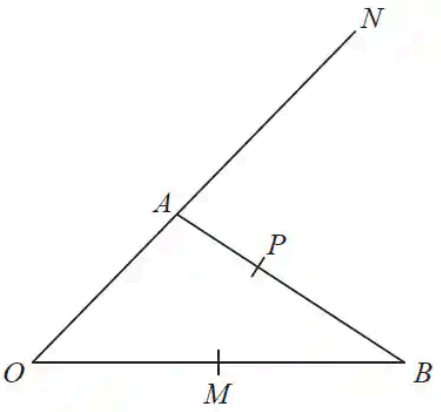
find the value of k.

$k =$ .....

(Total for Question 19 is 4 marks)

[Edexcel, GCSE, Summer 2017, Paper 1H, Q19]

2



OAN, OMB and APB are straight lines.
$AN = 2OA$.
M is the midpoint of OB.

$\overrightarrow{OA} = \mathbf{a}$ $\overrightarrow{OB} = \mathbf{b}$

$\overrightarrow{AP} = k\overrightarrow{AB}$ where k is a scalar quantity.

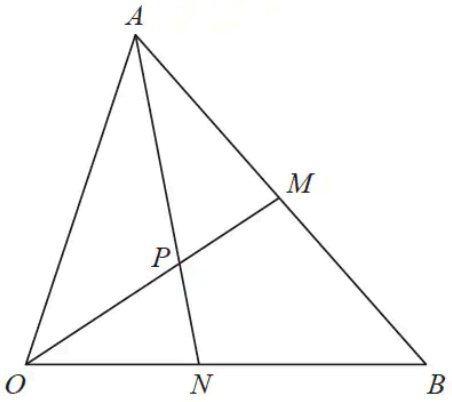
Given that MPN is a straight line, find the value of k.

.....

(Total for Question 21 is 5 marks)

[Edexcel, GCSE, Autumn 2017, Paper 3H, Q21]

3



OAB is a triangle.
OPM and APN are straight lines.
M is the midpoint of AB.

$\overrightarrow{OA} = \mathbf{a}$ $\overrightarrow{OB} = \mathbf{b}$

$OP : PM = 3 : 2$

Work out the ratio $ON : NB$

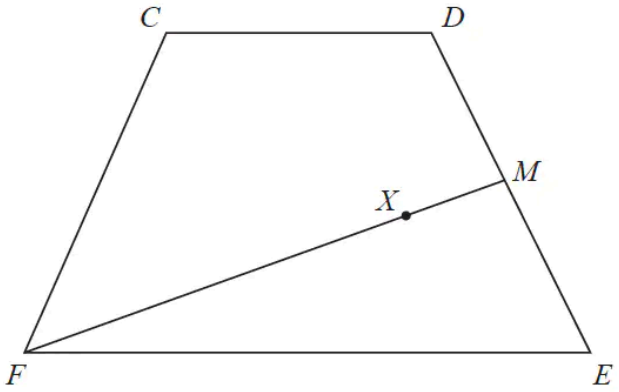
.....

(Total for Question 21 is 5 marks)

[Edexcel, GCSE, Autumn 2018, Paper 1H, Q21]

4

CDEF is a quadrilateral.



$\overrightarrow{CD} = \mathbf{a}$, $\overrightarrow{DE} = \mathbf{b}$ and $\overrightarrow{FC} = \mathbf{a} - \mathbf{b}$.

(a) Express $\overrightarrow{FE}$ in terms of **a** and/or **b**.
Give your answer in its simplest form.

.....

(2)

M is the midpoint of *DE*.
X is the point on *FM* such that $FX : XM = n : 1$
CXE is a straight line.

(b) Work out the value of n.

$n =$ .....

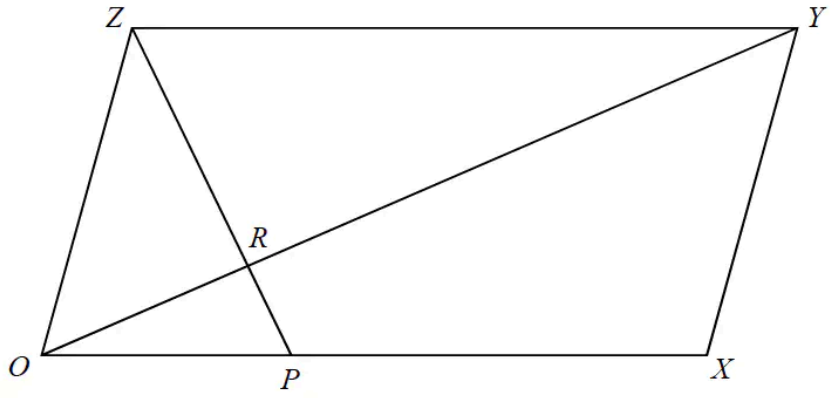
(4)

(Total for Question 20 is 6 marks)

[Edexcel, GCSE, Summer 2019, Paper 2H, Q20]

5

$OXYZ$ is a parallelogram.



$\overrightarrow{OX} = \mathbf{a}$

$\overrightarrow{OY} = \mathbf{b}$

P is the point on OX such that $OP : PX = 1 : 2$
R is the point on OY such that $OR : RY = 1 : 3$

Work out, in its simplest form, the ratio $ZP : ZR$
You must show all your working.

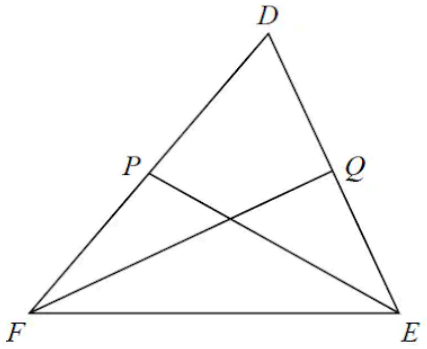
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(Total for Question 24 is 5 marks)

[Edexcel, GCSE, Autumn 2019, Paper 3H, Q24]

6

DEF is a triangle.



P is the midpoint of FD.
Q is the midpoint of DE.

$\overrightarrow{FD} = \mathbf{a}$ and $\overrightarrow{FE} = \mathbf{b}$

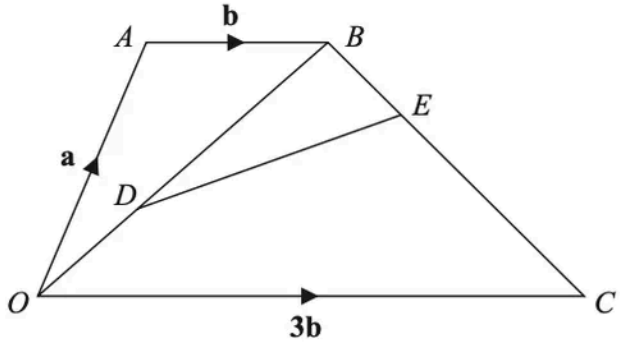
Use a vector method to prove that PQ is parallel to FE.

(Total for Question 21 is 4 marks)

[Edexcel, GCSE, Autumn 2020, Paper 1H, Q21]

7

$OABC$ is a trapezium.



$\overrightarrow{OA} = \mathbf{a}$
$\overrightarrow{AB} = \mathbf{b}$
$\overrightarrow{OC} = \mathbf{3b}$

D is the point on OB such that $OD : DB = 2 : 3$
E is the point on BC such that $BE : EC = 1 : 4$

Work out the vector $\overrightarrow{DE}$ in terms of **a** and **b**.
Give your answer in its simplest form.

.....

(Total for Question 18 is 4 marks)

[Edexcel, GCSE, Autumn 2021, Paper 3H, Q18]

8

A, B and C are three points such that

$\overrightarrow{AB} = 3\mathbf{a} + 4\mathbf{b}$

$\overrightarrow{AC} = 15\mathbf{a} + 20\mathbf{b}$

(a) Prove that A, B and C lie on a straight line.

(2)

D, E and F are three points on a straight line such that

$\overrightarrow{DE} = 3\mathbf{e} + 6\mathbf{f}$

$\overrightarrow{EF} = -10.5\mathbf{e} - 21\mathbf{f}$

(b) Find the ratio

length of DF : length of DE

.....

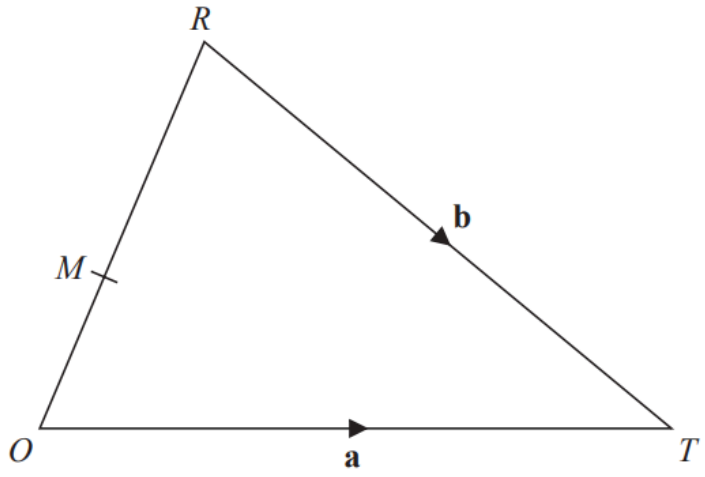
(3)

(Total for Question 15 is 5 marks)

[Edexcel, GCSE, Summer 2022, Paper 1H, Q15]

9

ORT is a triangle.



$\overrightarrow{OT} = \mathbf{a}$ $\overrightarrow{RT} = \mathbf{b}$

M is the point on OR such that $OM : MR = 2 : 3$

Express $\overrightarrow{MT}$ in terms of **a** and **b**.
Give your answer in its simplest form.

.....

(Total for Question 20 is 4 marks)

[Edexcel, GCSE, Summer 2023, Paper 2H, Q20]

10

Given that the vector $a\begin{pmatrix}2\\6\end{pmatrix}+b\begin{pmatrix}8\\2\end{pmatrix}$ is parallel to the vector $\begin{pmatrix}13\\6\end{pmatrix}$

find an expression for b in terms of a.

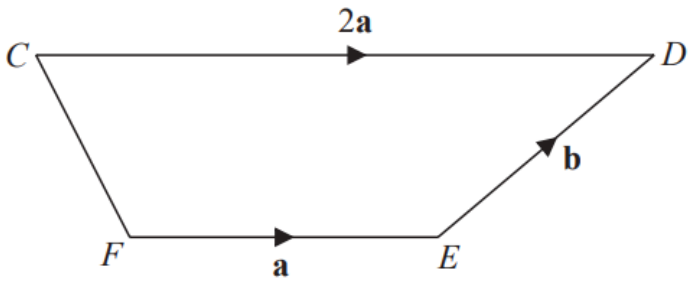
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(Total for Question 22 is 3 marks)

[Edexcel, GCSE, Summer 2023, Paper 3H, Q22]

11

CDEF is a quadrilateral.



$\overrightarrow{FE} = \mathbf{a}$ $\overrightarrow{ED} = \mathbf{b}$ $\overrightarrow{CD} = 2\mathbf{a}$

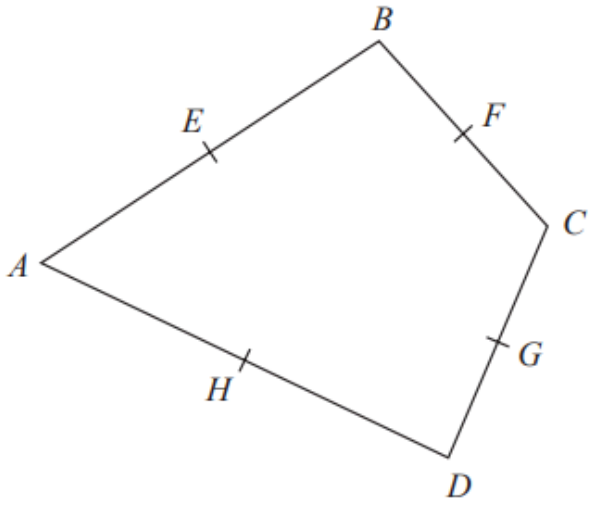
The point *P* is such that *CEP* is a straight line and that *CE* = *EP*

Use a vector method to prove that *CF* is parallel to *DP*.

(Total for Question 24 is 4 marks)

[Edexcel, GCSE, November 2022, Paper 3H, Q24]

12



$ABCD$ is a quadrilateral.

E, F, G and H are the midpoints of AB, BC, CD and DA.

$$\overrightarrow{AH} = \mathbf{a} \qquad \overrightarrow{AE} = \mathbf{b} \qquad \overrightarrow{DG} = \mathbf{c}$$

Prove, using vectors, that $EFGH$ is a parallelogram.

(Total for Question 18 is 4 marks)

[Edexcel, GCSE, November 2023, Paper 2H, Q18]