Maths.scot

National 5 Maths
Vectors

SQA past paper and specimen paper questions and answers by topic

Visit Maths.scot for full worked solutions to each of these questions.

National 5 Maths
SQA 2014 Paper 1
Question 4

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Find the resultant vector $2\boldsymbol{u}-\boldsymbol{v}$ when $\boldsymbol{u}=\begin{pmatrix}-2\\3\\5\end{pmatrix}$ and $\boldsymbol{v}=\begin{pmatrix}0\\-4\\7\end{pmatrix}$.

Express your answer in component form. **2**

Answer:

$$\begin{pmatrix}-4\\10\\3\end{pmatrix}$$

National 5 Maths
SQA 2015 Paper 2
Question 4

National 5 Maths
Maths.scot

Find $|\mathbf{u}|$, the magnitude of vector $\mathbf{u} = \begin{pmatrix} 6 \\ -13 \\ 18 \end{pmatrix}$. 2

Answer:

23

National 5 Maths
SQA 2015 Paper 2
Question 5

National 5 Maths
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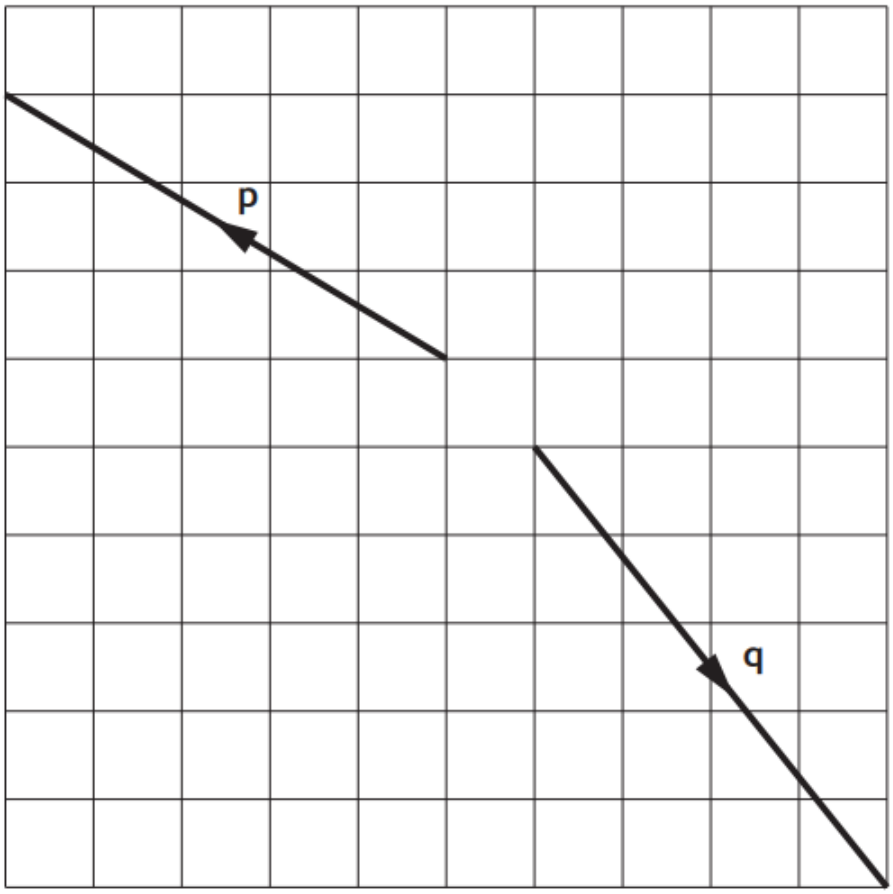
The vectors **p** and **q** are shown in the diagram below.

Find the resultant vector **p** + **q**.

Express your answer in component form.



2

Answer:

$\begin{pmatrix} -1 \\ -2 \end{pmatrix}$

National 5 Maths
SQA 2016 Paper 1
Question 1

National 5 Maths
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Given $\mathbf{p} = \begin{pmatrix} 4 \\ -6 \end{pmatrix}$ and $\mathbf{q} = \begin{pmatrix} -5 \\ -1 \end{pmatrix}$.

Find the resultant vector $\frac{1}{2}\mathbf{p} + \mathbf{q}$.

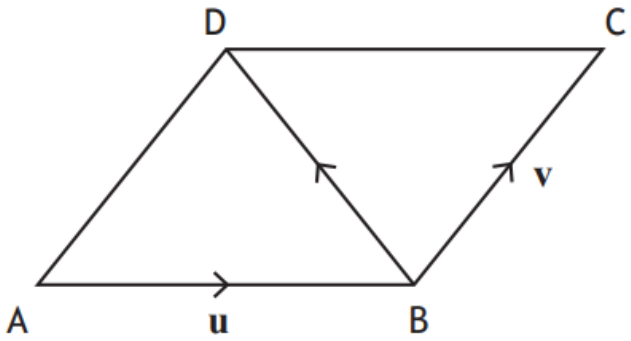
Express your answer in component form. **2**

Answer:

$\begin{pmatrix} -3 \\ -4 \end{pmatrix}$

National 5 Maths
SQA 2016 Paper 2
Question 3

The diagram below shows parallelogram ABCD.



$\overrightarrow{AB}$ represents vector $\mathbf{u}$ and $\overrightarrow{BC}$ represents vector $\mathbf{v}$.

Express $\overrightarrow{BD}$ in terms of $\mathbf{u}$ and $\mathbf{v}$. **1**

Answer:

$\underline{v} - \underline{u}$

National 5 Maths
SQA 2017 Specimen
Paper 1 Question 3

National 5 Maths
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Two forces acting on a rocket are represented by vectors $\mathbf{u}$ and $\mathbf{v}$.

$$\mathbf{u} = \begin{pmatrix} 2 \\ -5 \\ -3 \end{pmatrix} \text{ and } \mathbf{v} = \begin{pmatrix} 7 \\ 4 \\ -1 \end{pmatrix}.$$

Calculate $|\mathbf{u} + \mathbf{v}|$, the magnitude of the resultant force.

Express your answer as a surd in its simplest form. **3**

Answer:

$7\sqrt{2}$

National 5 Maths
SQA 2017 Specimen
Paper 1 Question 11

National 5 Maths
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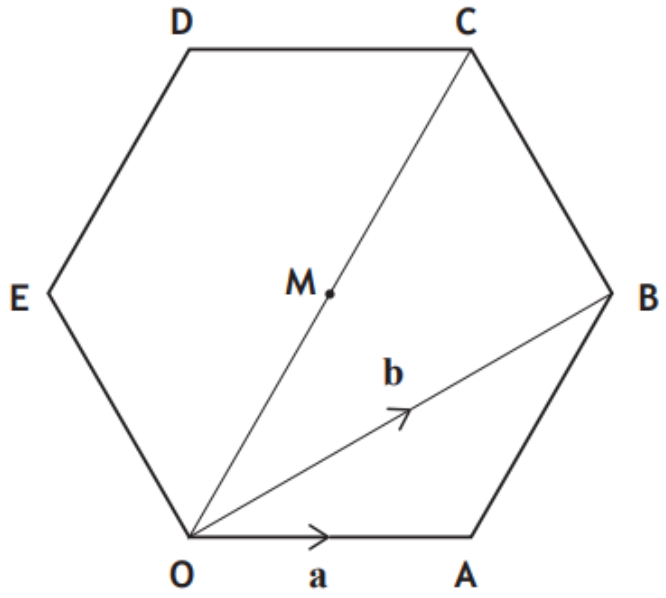
In the diagram, OABCDE is a regular hexagon with centre M.

Vectors **a** and **b** are represented by $\overrightarrow{OA}$ and $\overrightarrow{OB}$ respectively.



(a) Express $\overrightarrow{AB}$ in terms of **a** and **b**. 1

(b) Express $\overrightarrow{OC}$ in terms of **a** and **b**. 1

Answers:

(a) $\underline{b} - \underline{a}$ (or equivalent)

(b) $2(\underline{b} - \underline{a})$ or $2\underline{b} - 2\underline{a}$ (or equivalent)

National 5 Maths
SQA 2017 Paper 2
Question 1

Find $|\mathbf{v}|$, the magnitude of vector $\mathbf{v} = \begin{pmatrix} 18 \\ -14 \\ 3 \end{pmatrix}$. 2

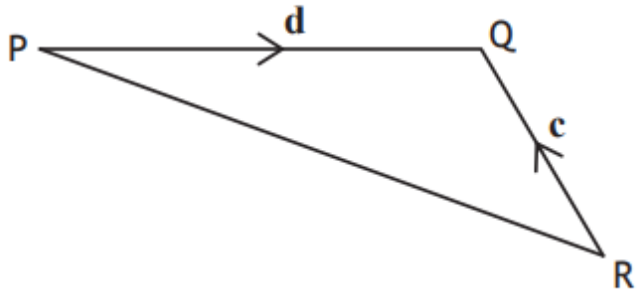
Answer:

23

National 5 Maths
SQA 2017 Paper 2
Question 8

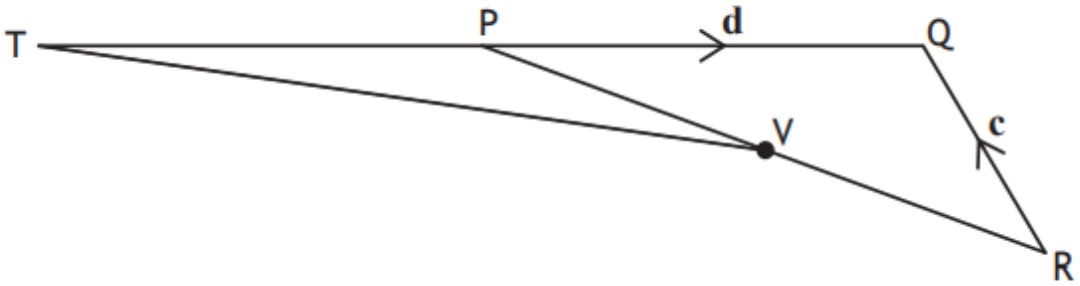
National 5 Maths
Maths.scot

In the diagram below, $\overrightarrow{RQ}$ and $\overrightarrow{PQ}$ represent the vectors **c** and **d** respectively.



(a) Express $\overrightarrow{PR}$ in terms of **c** and **d**. 1

The line QP is extended to T.



- TP = PQ
- V is the midpoint of PR

(b) Express $\overrightarrow{TV}$ in terms of **c** and **d**.
Give your answer in simplest form. 2

Answers:

(a) $\underline{d} - \underline{c}$ (or equivalent)

(b) $\frac{3}{2}\underline{d} - \frac{1}{2}\underline{c}$ (or equivalent)

National 5 Maths
SQA 2018 Paper 1
Question 4

National 5 Maths
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Two vectors are given by $\mathbf{u} = \begin{pmatrix} 1 \\ 5 \\ 1 \end{pmatrix}$ and $\mathbf{u} + \mathbf{v} = \begin{pmatrix} 6 \\ -4 \\ 3 \end{pmatrix}$.

Find vector $\mathbf{v}$.

Express your answer in component form. **2**

Answer:

$$\begin{pmatrix} 5 \\ -9 \\ 2 \end{pmatrix}$$

National 5 Maths
SQA 2018 Paper 2
Question 3

National 5 Maths
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Find $|\mathbf{r}|$, the magnitude of vector $\mathbf{r} = \begin{pmatrix} 24 \\ -12 \\ 8 \end{pmatrix}$. 2

Answer:

28

National 5 Maths
SQA 2018 Paper 2
Question 10

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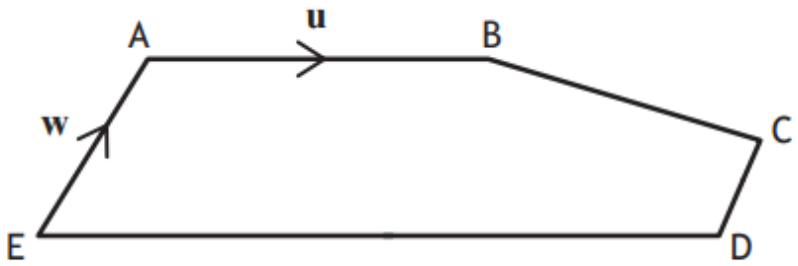
In the diagram below, $\overrightarrow{AB}$ and $\overrightarrow{EA}$ represent the vectors **u** and **w** respectively.



- $\overrightarrow{ED} = 2\overrightarrow{AB}$
- $\overrightarrow{EA} = 2\overrightarrow{DC}$

Express $\overrightarrow{BC}$ in terms of **u** and **w**.

Give your answer in its simplest form. **2**

Answer:

$\underline{u} - \frac{1}{2}\underline{w}$

National 5 Maths
SQA 2019 Paper 1
Question 10

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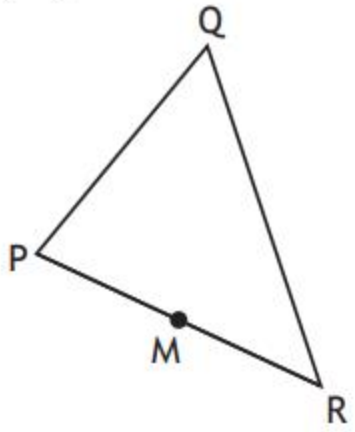
In triangle PQR, $\overrightarrow{PR} = \begin{pmatrix} 6 \\ -4 \end{pmatrix}$ and $\overrightarrow{RQ} = \begin{pmatrix} -1 \\ 8 \end{pmatrix}$.



(a) Express $\overrightarrow{PQ}$ in component form. **1**

M is the midpoint of PR.

(b) Express $\overrightarrow{MQ}$ in component form. **2**

Answers:

(a) $\begin{pmatrix} 5 \\ 4 \end{pmatrix}$

(b) $\begin{pmatrix} 2 \\ 6 \end{pmatrix}$

National 5 Maths
SQA 2019 Paper 2
Question 2

National 5 Maths
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Find $|\mathbf{p}|$, the magnitude of vector $\mathbf{p} = \begin{pmatrix} 6 \\ 27 \\ -18 \end{pmatrix}$. 2

Answer:

33

National 5 Maths
SQA 2021 Paper 1
Question 1

National 5 Maths
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Calculate $|\mathbf{d}|$, the magnitude of vector $\mathbf{d} = \begin{pmatrix} 1 \\ -4 \\ 8 \end{pmatrix}$. 2

Answer:

9

National 5 Maths
SQA 2021 Paper 2
Question 5

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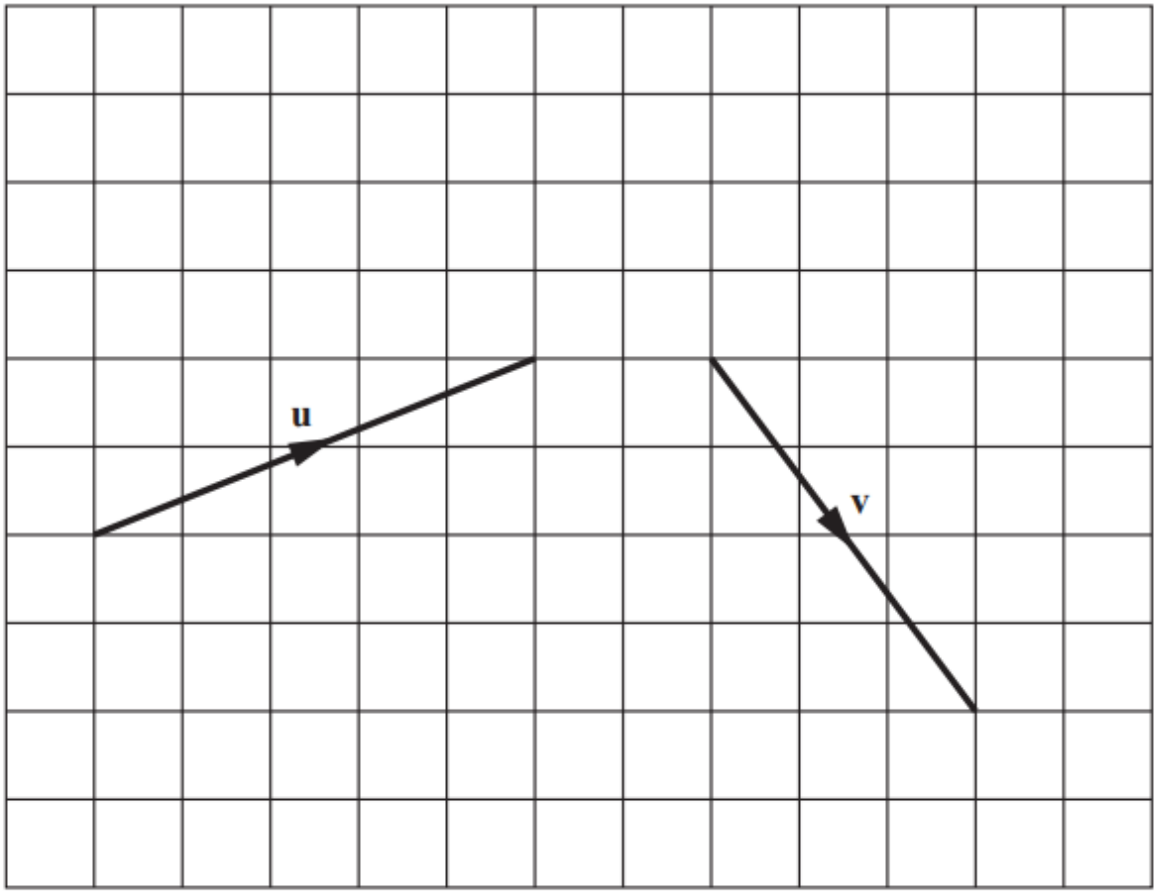
The vectors $\mathbf{u}$ and $\mathbf{v}$ are shown in the diagram below.



Find the resultant vector $\mathbf{u} - \mathbf{v}$.

Express your answer in component form. 2

Answer:

$$\begin{pmatrix} 2 \\ 6 \end{pmatrix}$$

National 5 Maths
SQA 2021 Paper 2
Question 17

National 5 Maths
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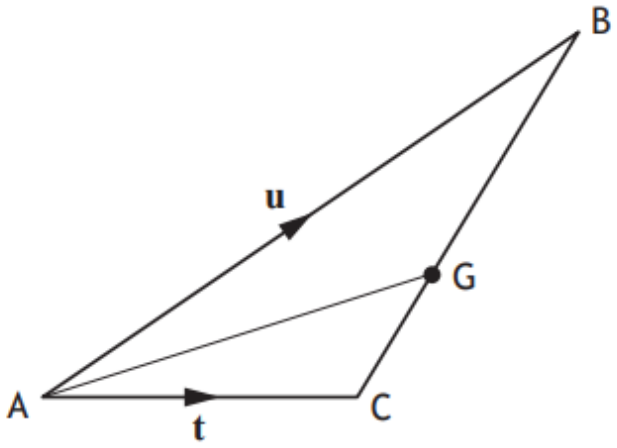
The triangle ABC is shown below



$\overrightarrow{AB} = \mathbf{u}$ and $\overrightarrow{AC} = \mathbf{t}$.

G is the point such that $CG = \frac{1}{3}CB$.

Express $\overrightarrow{AG}$ in terms of $\mathbf{u}$ and $\mathbf{t}$.

Give your answer in simplest form. **3**

Answer:

$\frac{2}{3}\underline{t} + \frac{1}{3}\underline{u}$ (or equivalent)

National 5 Maths
SQA 2024 Paper 1
Question 4

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Given $\mathbf{a} = \begin{pmatrix} 3 \\ 4 \\ -1 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} 5 \\ 3 \\ 2 \end{pmatrix}$, find the resultant vector $3\mathbf{a} + \mathbf{b}$.

Express your answer in component form. 2

Answer:

$\begin{pmatrix} 14 \\ 15 \\ -1 \end{pmatrix}$

National 5 Maths
SQA 2024 Paper 2
Question 14

National 5 Maths
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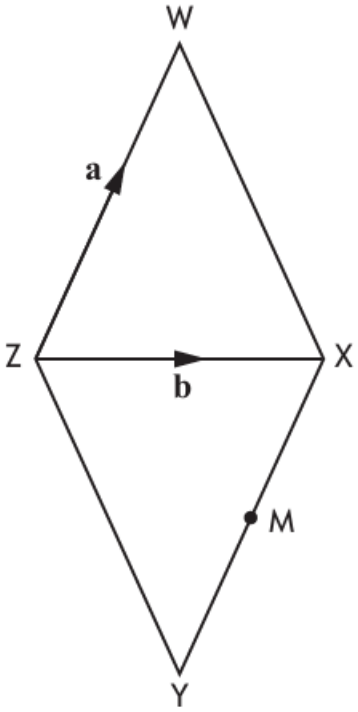
The diagram shows a rhombus WXYZ with a diagonal ZX drawn.



$\overrightarrow{ZW}$ represents vector $\mathbf{a}$ and $\overrightarrow{ZX}$ represents vector $\mathbf{b}$.

(a) Express $\overrightarrow{WX}$ in terms of $\mathbf{a}$ and $\mathbf{b}$. 1

M is the mid-point of XY.

(b) Express $\overrightarrow{WM}$ in terms of $\mathbf{a}$ and $\mathbf{b}$.
Give your answer in its simplest form. 2

Answers:

(a) $\mathbf{b}-\mathbf{a}$ or $-\mathbf{a}+\mathbf{b}$

(b) $\mathbf{b}-\frac{3}{2}\mathbf{a}$

National 5 Maths
SQA 2025 Paper 1
Question 13

National 5 Maths
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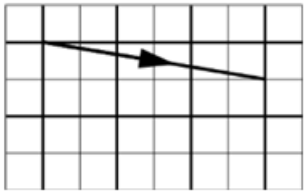
Vectors $\mathbf{p}$ and $\mathbf{q}$ have components $\mathbf{p} = \begin{pmatrix} 5 \\ 2 \end{pmatrix}$ and $\mathbf{q} = \begin{pmatrix} 1 \\ -3 \end{pmatrix}$.

Draw the resultant vector $\mathbf{p} + \mathbf{q}$ on the grid. **2**

Answer:

$\begin{pmatrix} 6 \\ -1 \end{pmatrix}$



National 5 Maths
SQA 2025 Paper 2
Question 15

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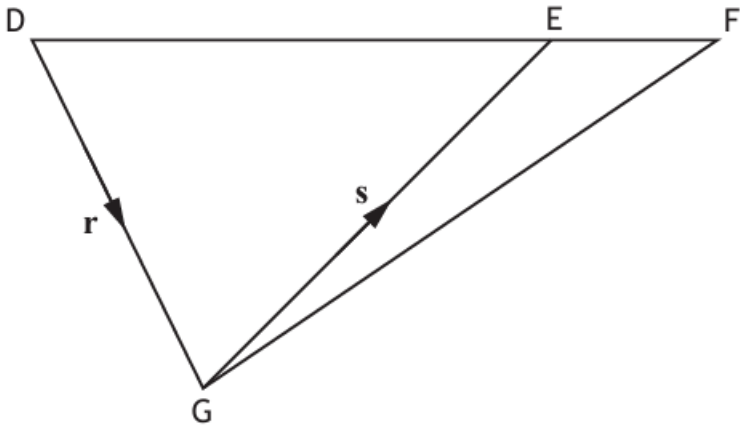
In the diagram, $\overrightarrow{DG}$ and $\overrightarrow{GE}$ are represented by the vectors $\mathbf{r}$ and $\mathbf{s}$ respectively, and $\overrightarrow{DE} = 3\overrightarrow{EF}$.



Express $\overrightarrow{GF}$ in terms of $\mathbf{r}$ and $\mathbf{s}$.

Give your answer in its simplest form. **2**

Answer:

$\frac{4}{3}\mathbf{s} + \frac{1}{3}\mathbf{r}$