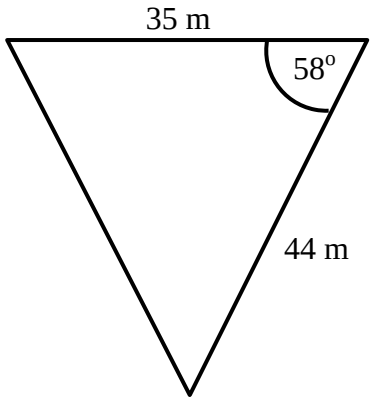
Practice Unit Assessment (1) for National 5 Applications

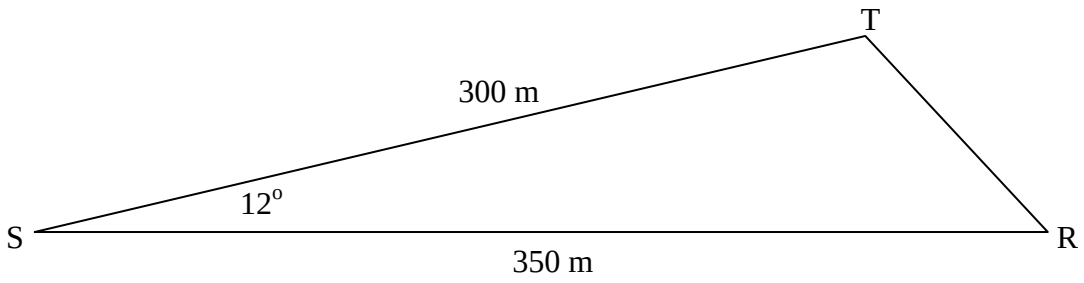
1. A farmer wishes to spread fertiliser on a triangular plot of ground.

The diagram gives the dimensions of the plot.



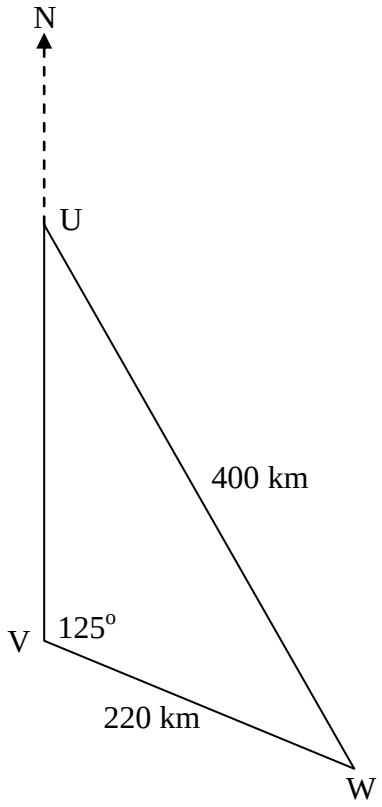
Calculate the area of this plot to the nearest square metre.

2. The diagram shows the paths taken by two runners, Barry and Charlie. Barry runs 350 metres from point S to position R. Charlie runs 300 metres to position T.



` What is the shortest distance between the two runners? [i.e. the distance TR on the diagram]

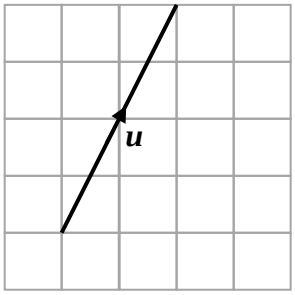
3. On an orienteering course there are three checkpoints at points U, V and W as shown in the diagram below.

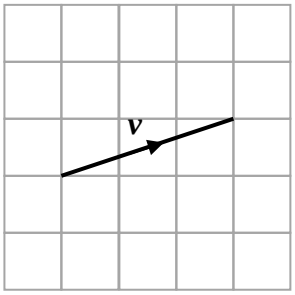


W is 220 kilometres from V and 400 kilometres from U.
W is on a bearing of 125° from V.

Calculate the bearing of W from U. i.e. the size of angle NUW in the diagram.
Give your answer to the nearest degree.

4. The diagrams below show 2 directed line segments ***u*** and ***v***.

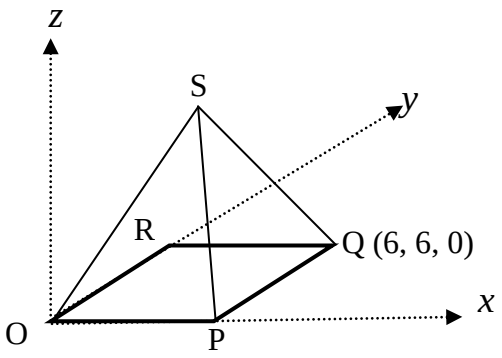




Draw the resultant of $3\boldsymbol{u}+\boldsymbol{v}$.

5. The diagram below shows a square based model of a glass pyramid of height 8 cm. Square OPQR has a side length of 6 cm.

The coordinates of Q are (6, 6, 0). R lies on the *y*-axis.



Write down the coordinates of S.

6. The forces acting on a body are represented by three vectors ***a***, ***b*** and ***c*** as given below.

$$\boldsymbol{a}=\begin{pmatrix}5\\2\\2\cdot5\end{pmatrix} \qquad \boldsymbol{b}=\begin{pmatrix}-3\\7\\5\cdot5\end{pmatrix} \qquad \boldsymbol{c}=\begin{pmatrix}1\cdot5\\6\\-2\end{pmatrix}$$

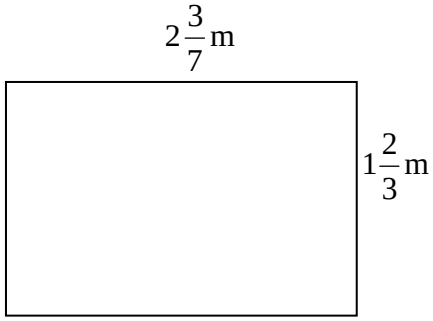
Find the resultant force.

7. Vector $\boldsymbol{p} = \begin{pmatrix} 5 \\ 3 \end{pmatrix}$ and vector $\boldsymbol{q} = \begin{pmatrix} 1 \\ -3 \end{pmatrix}$.

Calculate $\left| 2\boldsymbol{p} + \boldsymbol{q} \right|$

8. Kashef bought a new car for £24 000. Its value decreased by 12% each year. Find the value of the car after 5 years.

9. A desk top has measurements as shown in the diagram.



Calculate the exact area of the desk top (in m^2).

10. A man invested some money in a Building Society last year.

It has increased in value by 15% and is now worth £2760.

Calculate how much the man invested.

11. The cost of a set menu meal in 7 different café style restaurants were as follows:

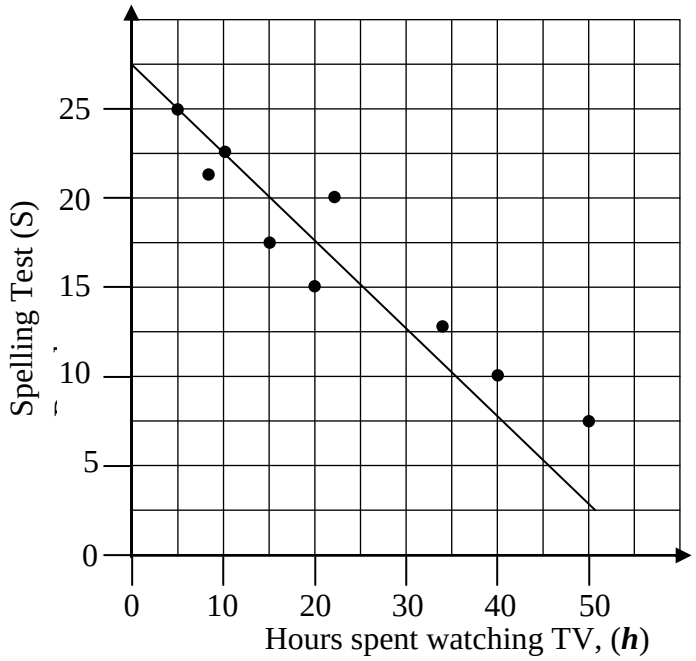
£14 £17 £13 £14 £11 £19 £17

(a) Calculate the mean and standard deviation of these costs.

(b) In 7 up market restaurants the mean cost of a meal was £22 with a standard deviation of 2·2.

Using these statistics, compare the profits of the two companies and make two valid comparisons.

12. A primary teacher took a note of the results in a spelling test and the number of hours of TV that some of her pupils watched in a week. She then drew the following graph.



(a) Determine the gradient and the *y*-intercept of the line of best fit shown.

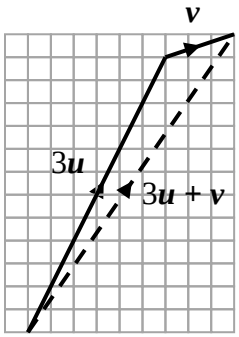
(b) Using these values for the gradient and the *y*-intercept, write down the equation of the line.

(c) Estimate the mark in the spelling test if the pupil spent 25 hours watching television.

End of Question Paper

Practice Unit Assessment (1) for Applications: Marking Scheme

Points of reasoning are marked # in the table.

Question	Main points of expected responses	
1	•[1] substitute into formula •[2] correct answer	•[1] $\frac{1}{2}\times 35\times 44\times \sin 58°$ •[2] 653 m^2
2	•[1] use correct formula •[2] substitute correctly •[3] process to s^2 •[4] take square root	•[1] selects cosine rule •[2] $s^2 = 300^2 + 350^2 - 2\times 300\times 350\times \cos 12°$ •[3] 7 089 •[4] 84·1 metres (rounding not required)
3	#2.1 uses correct strategy •[1] finds angle U •[2] states bearing from U	#2.1 $\sin U = \frac{220\sin 125°}{400}$ then valid steps below •[1] 26·8° •[2] 153·2^o (rounding not required)
4	•[1] draws 3***u*** •[2] applies head-to-tail method when adding ***v*** •[3] draws resultant from tail of 3***u*** to head of ***v***.	
5	•[1] correct point	•[1] (3, 3, 8)

6	$\bullet^1$ add to get resultant $\bullet^2$ correct answer	$\bullet^1$ $\begin{pmatrix}5\\2\\2\cdot5\end{pmatrix}+\begin{pmatrix}-3\\7\\5\cdot5\end{pmatrix}+\begin{pmatrix}1\cdot5\\6\\-2\end{pmatrix}$ $\bullet^2$ $\begin{pmatrix}3\cdot5\\15\\6\end{pmatrix}$
7	$\bullet^1$ correct scalar multiplication then addition $\bullet^2$ calculate magnitude $\bullet^3$ correct answer	$\bullet^1$ $\begin{pmatrix}10\\6\end{pmatrix}+\begin{pmatrix}1\\-3\end{pmatrix}=\begin{pmatrix}11\\3\end{pmatrix}$ $\bullet^2$ $\sqrt{11^2+3^2}$ $\bullet^3$ $\sqrt{130}$
8	$\bullet^1$ start calculation $\bullet^2$ process calculation $\bullet^3$ correct answer Note: repeated subtraction method can be used	$\bullet^1$ 0·88 $\bullet^2$ 24 000 × $0{\cdot}88^5$ $\bullet^3$ £12 665·57 equivalent
9	$\bullet^1$ area calculation $\bullet^2$ correct answer	$\bullet^1$ $\frac{17}{7}\times\frac{5}{3}$ $\bullet^2$ $\frac{85}{21}=4\frac{1}{21}$ m²
10	#2.1 appropriate strategy $\bullet^1$ correct answer	#2.1 eg 1 + 0·15 x = £2760 $\bullet^1$ £2 400
11 (a) **(b)**	$\bullet^1$ mean for A $\bullet^2$ calculates $(x-\bar{x})^2$ $\bullet^3$ substitute into formula $\bullet^4$ correct standard deviation #2.2 Compares mean and standard deviation in a valid way for data	$\bullet^1$ 105 ÷ 7 = 15 $\bullet^2$ 1, 4, 4, 1, 16, 16, 4 $\bullet^3$ $\sqrt{\frac{46}{6}}$ $\bullet^4$ 2·77 (rounding not required) (Equivalent calculations can be used) #2.2 On average up market prices more expensive There is less of a spread in up market restaurants

12 (a)	•[1] chooses 2 distinct points and substitutes into gradient formula •[2] calculates gradient •[3] finds intercept •[4] writes down equation # 2.2 estimate mark	•[1] $m = \frac{22 \cdot 5 - 7 \cdot 5}{10 - 40}$ •[2] $m = -\frac{1}{2}$ (or based on gradient line of best fit •[3] $c = 27 \cdot 5$ (approximately or by calculation or from graph) •[4] $S = -\frac{1}{2}h + 27 \cdot 5$ (or equivalent) #2.2 Approximately 15 hours
(b)		
(c)		