

Mathematics

N5 Applications

Test 1

H22J 75 Package 1: Unit-By-Unit approach

Name: _____ **Class:** _____ **Date:** _____

Notes:

1. Answer the questions in the space provided.
2. You may use a calculator.
3. Full credit will only be given where the solution contains appropriate working.

This paper will assess:

Assessment Standard	Questions	Threshold:	Marks achieved	P or F
1.1 Applying trigonometric skills to triangles which do not have a right angle	1, 2, 3	4 out of 8		
1.2 Applying geometric skills to vectors	4, 5, 6, 7	5 out of 9		
1.3 Applying numerical skills to fractions and percentages	8, 9, 10	4 out of 8		
1.4 Applying statistical skills to analysing data	11, 12	4 out of 8		
2.1 Interpreting a situation where mathematics can be used and identifying a valid strategy	3	1 out of 1		
2.2 Explaining a solution and/or relating it to context	11	1 out of 1		

Overall Threshold: $\frac{21}{35} = 60\%$

Total Score: $\frac{\quad}{35} = \quad \%$

Pass/Fail

Marker: _____

Date: _____

Cross Marker: _____

Date: _____

Formulae List

Standard deviation: $s = \sqrt{\frac{\sum(x-\bar{x})^2}{n-1}} = \sqrt{\frac{\sum x^2 - (\sum x)^2/n}{n-1}}$, where n is the sample size

Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc \cos A$ or $\cos A = \frac{b^2 + c^2 - a^2}{2bc}$

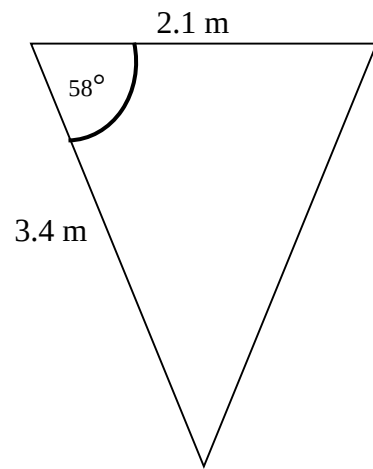
Area of a triangle: $Area = \frac{1}{2} ab \sin C$

Applications Assessment Standard 1.1

- 1 Fraser wants to design a flower bed as shown below.

The diagram gives the dimensions of the bed.

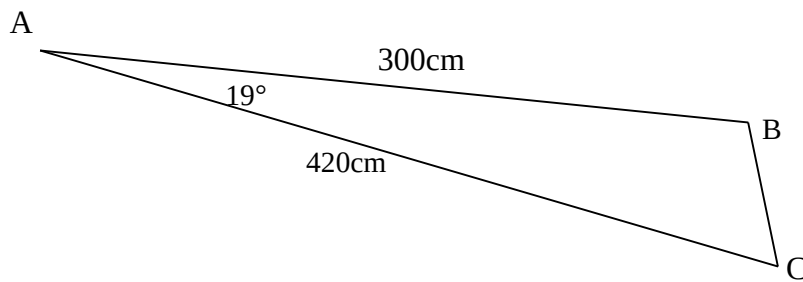
Calculate the area of this flower bed.



Marks

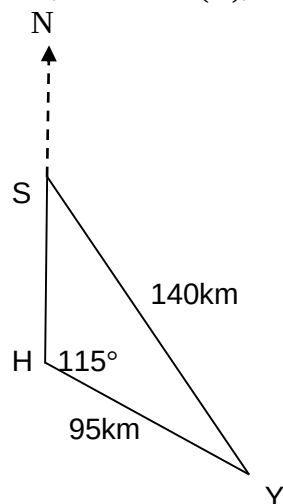
(2)

- 2 A ball is rolled from the point A towards the point B. It misses and land at C instead. How far did the ball land from B?



(3)

- 3 In a body of water, a harbour (H), a ship (S) and a yacht (Y) are positioned as shown below.



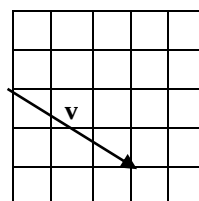
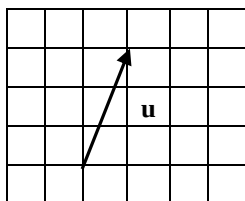
The yacht is 95km from the harbour and 140km from the ship. The yacht is on a bearing of 115° from the harbour.

Calculate the bearing of the yacht from the ship.

(#2.1 and 3)

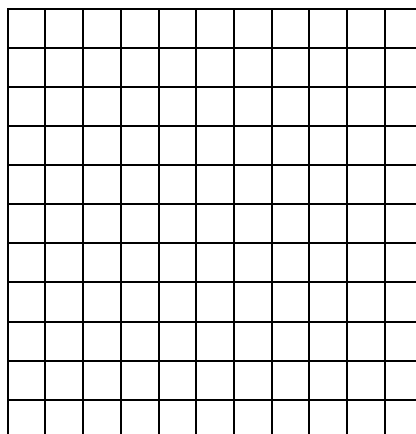
Applications Assessment Standard 1.2

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



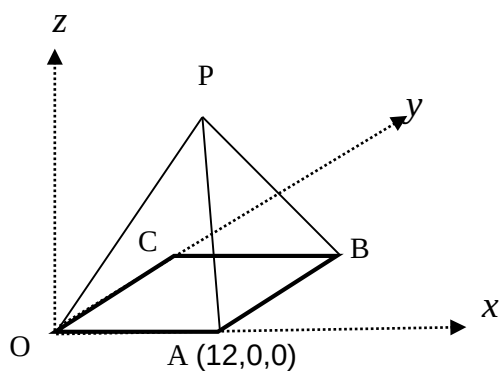
Draw the resultant of $3\mathbf{u} + 2\mathbf{v}$.

(3)



- 5 The diagram below shows a square based model of a pyramid of height 10 cm. Square OABC has a side length of 12 cm.

The coordinates of A are (12,0,0). C lies on the y-axis.



Write down the coordinates of P.

(1)

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

$$\mathbf{a} = \begin{pmatrix} 5 \\ 2 \\ 1.5 \end{pmatrix} \quad \mathbf{b} = \begin{pmatrix} -2.5 \\ -1.5 \\ 6.5 \end{pmatrix}, \quad \mathbf{c} = \begin{pmatrix} 3 \\ 9.5 \\ -8.5 \end{pmatrix}$$

Find the resultant force. (2)

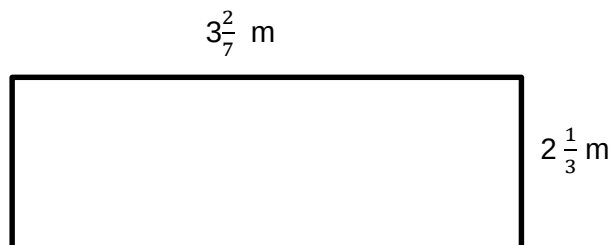
- 7 Vector **a** = $\begin{pmatrix} 5 \\ 2 \end{pmatrix}$ and vector **b** = $\begin{pmatrix} -6 \\ 0 \end{pmatrix}$.

Calculate $|3\mathbf{a} + 2\mathbf{b}|$. (3)

Applications Assessment Standard 1.3

- 8 A new house was bought for £98 000. Its value decreased by 7% each year. Find the value of the house after 5 years. (3)

- 9 Clare measures the length and breadth of a table top as shown in the diagram below.



Calculate the exact area of the table top in square metres. (2)

- 10 The “length” of a new born baby was measured immediately after birth.

Five weeks later it had increased in length by 23% to 57cm. What was the baby’s length when it was born?

Give your answer to two decimal places.

(3)

Applications Assessment Standard 1.4

- 11 The table below shows the monthly profits made by a mobile telephone company, O₄, during the period January to July 2014. Profits are in millions of euros.

Name of company	Profits in millions of euros						
	Jan	Feb	Mar	Apr	May	Jun	Jul
Company O ₄	23	20	19	20	23	20	22

- (a) Calculate the mean and standard deviation of Company O₄’s profits during this 7-month period.

(4)

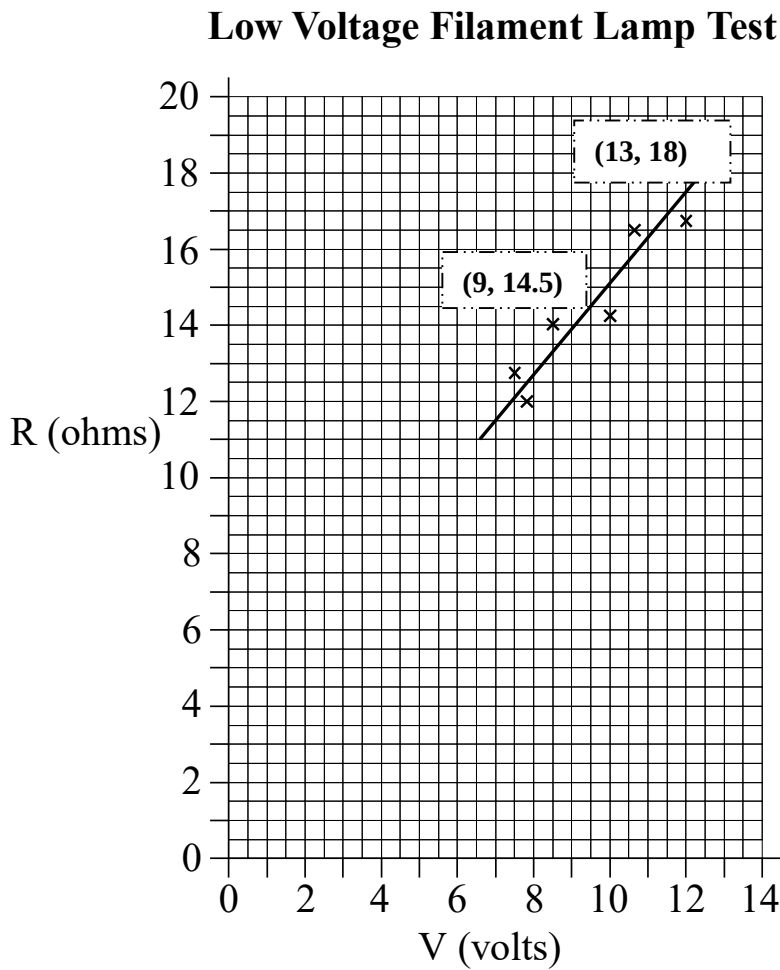
- (b) During this 7-month period, another company, Company O₆, had monthly profits with a mean of 19·57 million euros and a standard deviation of 1·4 million euros.

Make **two** valid statements to compare the profits of the two companies.

(#2.2)

- 12 Paul conducted a test on a low voltage filament lamp testing the resistance (R ohms) at various voltages (V volts).

He plotted the results from the test in the scatter graph below.



- (a) Determine the gradient of the line of best fit shown.

(1)

- (b) Find the equation of the line of best fit in terms of R and V .
Give the equation in its simplest form

(2)

- (c) Estimate the value of the resistance when the voltage is 21 volts.

(1)

End of Test

Space for additional working