## **Practice Unit Assessment (3) for National 5 Applications**

**1.** Turf has to be laid on a triangular plot of garden

The diagram gives the dimensions of the plot.



Calculate the area, to the nearest square metre, of turf that is required.

2. Billy and Peter are bowlers. They are playing a game and after they each throw their first bowl they are in the positions shown in the diagram.



How far apart are the bowls after this first throw?[i.e. the distance PB on the diagram]

**3.** The positions of three players, K, L and M are shown in this diagram.



Player M is 30 metres from player L and 40 metres from player K. M is on a bearing of  $125^{\circ}$  from L.

Calculate the bearing of player M from player K. i.e. the size of angle NKM in the diagram. Give your answer to the nearest degree.





5. The diagram below shows a square based model of a glass pyramid of height 5 cm. The base OPQR is a square.

The coordinates of S are (2, 2, 5). P lies on the *x*-axis and R lies on the *y* – axis.



Write down the coordinates of Q.

6. The forces acting on a body are represented by three vectors x, y and z as given below.

$$\boldsymbol{x} = \begin{pmatrix} 4\\ 2 \cdot 3\\ -1 \end{pmatrix} \qquad \boldsymbol{y} = \begin{pmatrix} -2\\ 2 \cdot 7\\ 0 \cdot 5 \end{pmatrix} \qquad \boldsymbol{z} = \begin{pmatrix} -2\\ 1\\ -2 \end{pmatrix}$$

Find the resultant force.

7. Vector 
$$\boldsymbol{x} = \begin{pmatrix} 3 \\ 6 \end{pmatrix}$$
 and vector  $\boldsymbol{y} = \begin{pmatrix} 2 \\ 5 \end{pmatrix}$ .

Calculate |3x-2y|

**8.** Chocolate fountains have become very popular at parties.

At one party 23% of the remaining chocolate was used every 20 minutes.

If 2kg of melted chocolate was added to the fountain at the start of the night, how much would be left after 1 hour?

9. Calculate the area of this piece of ground which has dimensions as shown in the diagram.



- 10. I bought a car three years ago.Since then it has decreased in value by 45% and is now worth £6875.How much did I pay for the car?
- **11.** A set of Maths test marks for a group of students are shown below.

35 27 43 18 36 39

- (a) Find the mean and standard deviation.
- (b) Another group had a mean of 37 and a standard deviation of 8.6.Compare the test marks of the two classes.



12. A selection of the number of games won and the total points gained by teams in the Scottish Premier League were plotted on this scattergraph and the line of best fit was drawn.



- (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) Use your equation to estimate the number of points gained by a team who win 27 games.

## End of Question Paper

**Marking Scheme** 

Points of reasoning are marked # in the table.

Question	Main points of expected responses
1	• substitute into formula • $\frac{1}{2} \times 27 \times 25 \times \sin 102^{\circ}$
	• contect answer • 330 m <sup>-</sup>
2	• <sup>1</sup> use correct formula $\bullet^1$ selects cosine rule
	• <sup>2</sup> substitute correctly $t^2 = 24^2 + 26^2 - 2 \times 24 \times 26 \times \cos 17^\circ$
	• <sup>3</sup> process to $t^2$ • <sup>3</sup> 58.53
	• <sup>4</sup> take square root • <sup>4</sup> $7.7$ metres (rounding not required)
3	#2.1 uses correct strategy #2.1 sin $K = \frac{30 \sin 125^{\circ}}{40}$ then valid steps below
	• <sup>1</sup> finds angle $K$ • <sup>1</sup> 38°
	• <sup>2</sup> states bearing from $K^{-2}$ 142° (rounding not required)
4	• <sup>1</sup> draws $\boldsymbol{k}$
	• <sup>2</sup> applies head-to-tail method when adding 2 <i>l</i>
	• <sup>3</sup> draws resultant from tail of $k$ to head of $2l$
5	$\bullet^1$ correct point $\bullet^1$ (4.4.0)

6	<ul> <li>add to get resultant</li> <li>correct answer</li> </ul>	• <sup>1</sup> $\begin{pmatrix} 4\\2\cdot3\\-1 \end{pmatrix} + \begin{pmatrix} -2\\2\cdot7\\0\cdot5 \end{pmatrix} + \begin{pmatrix} -\\1\\-2 \end{pmatrix}$ • <sup>2</sup> $\begin{pmatrix} 0\\6\\-2\cdot5 \end{pmatrix}$
7	• <sup>1</sup> correct scalar multiplication then addition	• <sup>1</sup> $\binom{9}{18} - \binom{4}{10} = \binom{5}{8}$
	$\bullet^2$ calculate magnitude	$\bullet^2 \qquad \sqrt{5^2 + 8^2}$
	$\bullet^3$ correct answer	$\bullet^3$ $\sqrt{89}$
8	$\bullet^1$ start calculation	• <sup>1</sup> 0.77
	• $^{2}$ process calculation	• <sup>2</sup> 2 000 × 0.77 <sup>3</sup> • <sup>3</sup> 012 <sup>2</sup>
	• confect answer	• 915g
	Note: repeated addition method can be used	equivalent - 3
9	• <sup>1</sup> area calculation	• $\frac{25}{\times} \times \frac{51}{2}$
	$\bullet^2$ correct answer	• <sup>2</sup> $\frac{4}{255} = 63\frac{3}{4}$ m <sup>2</sup>
10	#2.1 appropriate strategy	#2.1 eg (1 – 0.45) $x = \pounds 6875$
	• <sup>1</sup> correct answer	• <sup>1</sup> £12 500
11 (a)	• <sup>1</sup> mean	• $198 \div 6 = 33$
	• <sup>2</sup> calculates $(x - \bar{x})^2$	• <sup>2</sup> 4, 36, 100, 225, 9, 36
	• <sup>3</sup> substitute into formula	$\bullet^3 \qquad \sqrt{\frac{410}{5}}$
	• <sup>4</sup> correct standard deviation	<ul> <li><sup>4</sup> 9 (rounding not required)</li> <li>(Equivalent calculations can be used)</li> </ul>
(b)	#2.2 Compares mean and standard deviation in a valid way for data	#2.2 On average second group had higher marks
		Second group's marks less spread out

12 (a)	<ul> <li><sup>1</sup> chooses 2 distinct points and substitutes into gradient formula</li> <li><sup>2</sup> calculates gradient</li> <li><sup>3</sup> finds intercept</li> </ul>	•1 $m = \frac{40-20}{12-6}$ •2 $m = \frac{10}{3}$ (or based on gradient line of best fit) •3 $c = 0$ (approximately or by calculation or from graph)
(b)	• <sup>4</sup> writes down equation	• <sup>4</sup> $P = \frac{10}{3} W$ (or equivalent)
(c)	# 2.2 estimate mark	#2.2 90 points