

National 5 Mathematics Homework
Exercise 16



Vectors

1. a) Draw a vector diagram for \mathbf{m} and \mathbf{n} and the resultant vector $\mathbf{m} + \mathbf{n}$ if:-

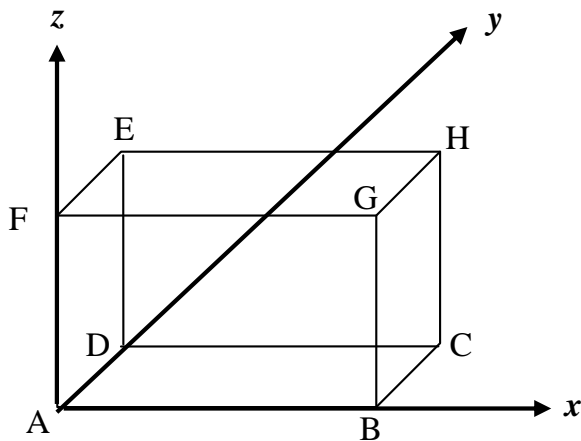
$$\mathbf{m} = \begin{pmatrix} 2 \\ 3 \end{pmatrix} \text{ and } \mathbf{n} = \begin{pmatrix} 3 \\ 1 \end{pmatrix}$$

- b) State the components of $\mathbf{m} + \mathbf{n}$.

- c) Calculate the magnitude of $\mathbf{m} + \mathbf{n}$.

(7)

2. On the diagram below A is the point (0,0,0) and H is (8,3,6).



- a) Write down the coordinates of
(i) E (ii) C.

- b) $\mathbf{a} = \overrightarrow{DH}$ write down the components of \mathbf{a} .

- c) If the two space diagonals, AH and EB, are drawn where will they cross?

(4)

3. If $\mathbf{a} = \begin{pmatrix} 4 \\ -3 \\ 6 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} -4 \\ -5 \\ -7 \end{pmatrix}$ calculate the resultant vector of $3\mathbf{a} + 4\mathbf{b}$.

(3)

4. Calculate the magnitude of \overrightarrow{AB} if A $\begin{pmatrix} 2 \\ 3 \\ 7 \end{pmatrix}$ and B $\begin{pmatrix} 5 \\ -6 \\ 8 \end{pmatrix}$.

(5)

5. Prove that triangle PQR is isosceles if P(3, 4, -1), Q(9, 8, 11) and R (-9, -2, 3).

(7)

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Exercise 17



Percentages

1. Michael earns an annual salary of £14 870. He has just been awarded a salary increase of 5%. Calculate his new annual salary. (2)

2. A sample of machine's output is examined. Out of a batch of 70 component, 6 are found to be faulty.

- a) What percentage of the sample are faulty?
b) The machine's output on the last shift was 5800.
Estimate the number of faulty components produced in the last shift.



3. Calculate the compound interest received on £3500 invested for 4 years at 4% per annum. (4)

4. Frank Graham deposited £6000 in his bank and left it there for 3 years, gaining interest each year. The interest rate was 7% in the first year, 5% in the second year, but rose to 9.6% in the third year. He withdrew all his money at the end of year 3. How much did he then receive? Give your answer correct to **two significant figures**. (4)

5. Ged buys a new car for £14 560 in January 2008. He calculates that it will depreciate by 20% at the end of the first year and then by 15% during each year thereafter. What will the car be worth in January 2012. (5)



6. Victoria bought a jacket in the sale which had 20% off. If it cost £36 in the sale, what did it cost before the sale? (2)

7. The pressure in a boiler is 120 poundals. A faulty valve causes the pressure to rise in the boiler by 12% every hour. The situation becomes dangerous when the pressure reaches 200 poundals.

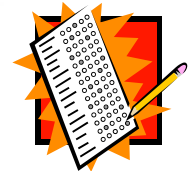
If it continues to rise this way, during which hour will the boiler's pressure be dangerous? (3)

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Exercise 18



Statistics



1. Here is a table of exam results for ten pupils:-

Maths results	20%	35%	60%	90%	45%	70%	85%	10%	65%	30%
Physics results	35%	30%	55%	95%	40%	75%	80%	20%	50%	35%

- Display these results on a scatter graph.
- Describe the correlation of the graph.
- Draw a line of best fit.
- Find the equation of the line of best fit.
- Use the equation to calculate what the maths result would be for someone who scored 50% in maths (9)

2. Write down the quartiles for this set of data.

2, 3, 5, 5, 8, 12, 15, 21, 22, 25, 32, 32, 35, 37 (3)

3. Find the semi-interquartile range for this list of data.

12, 4, 15, 6, 9, 10, 13, 8, 6, 7, 5, 7, 11 (4)

4. (a) The pulse rates, in beats per minute, of 6 adults in a hospital waiting area are:-

68 73 86 72 82 78

Calculate the mean and standard deviation of this data.

- 6 children in the same waiting area have a mean pulse rate of 89.6 beats per minutes and a standard deviation of 5.4.

Make **two** valid comparisons between the children's pulse rates and those of the adults. (7)

