

1 Evaluate each of the following.

(a) $\begin{pmatrix} 3 & 4 \\ 2 & -1 \end{pmatrix} - \begin{pmatrix} -2 & 6 \\ 1 & 5 \end{pmatrix}$ **[1]**

(b) $\begin{pmatrix} -2 & 1 \end{pmatrix} \begin{pmatrix} 1 \\ -3 \end{pmatrix}$ **[1]**

(c) $\begin{pmatrix} 3 \\ 2 \end{pmatrix} \begin{pmatrix} -2 & 1 \end{pmatrix}$ **[1]**

2 Given matrices $\mathbf{T} = \begin{pmatrix} 0 & 1 \\ 4 & -1 \end{pmatrix}$, $\mathbf{U} = \begin{pmatrix} 4 & a \\ -3 & 1 \end{pmatrix}$, $\mathbf{V} = \begin{pmatrix} -1 & 2 \\ b & 1 \end{pmatrix}$, find

(a) the value of a and of b such that $2\mathbf{U} + 3\mathbf{V} = \mathbf{V}^2$, **[4]**

(b) matrix $\mathbf{R}$ if $\mathbf{TR} = \begin{pmatrix} 2 \\ 2 \end{pmatrix}$. **[3]**

- 3** An Active Ageing Centre runs morning and afternoon activity sessions for 5 days each week. Each senior attends either the morning session or the afternoon session every day.

The seniors are grouped into three activity groups – Wellness, Fitness and Arts. The table shows the number of seniors in each group in week 1.

	Wellness	Fitness	Arts
Morning	16	10	15
Afternoon	10	15	20

- (a)** Represent the data in the table by using a 2×3 matrix **H**. **[1]**

- (b)** Each senior is charged a fee for each session.

The session fee is \$5 for Wellness, \$8 for Fitness and \$6 for Arts.

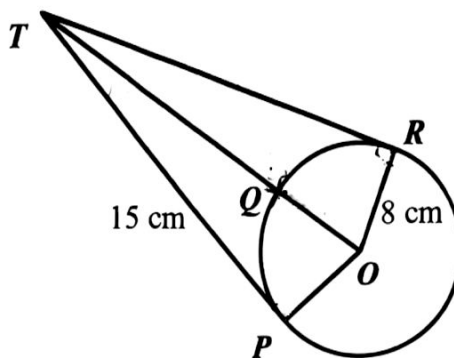
- Represent the fees in a 3×1 column matrix **F**. **[1]**

- (c)** Given that matrix **M** = **HF**, evaluate **M**. **[2]**

- (d)** State what the elements of matrix **M** represent. **[1]**

- (e)** Using matrix multiplication and matrix **M**, calculate the total amount of fees collected by the centre in week 1. **[2]**

- 4 In the diagram, the points P , Q and R lie on the circle with centre O . TP and TR are tangents to the circle at P and R respectively. OQT is a straight line. The radius of the circle is 8 cm and $PT = 15$ cm.



- (a) State the length of TR .

[1]

- (b) Explain briefly why $\angle ORT$ is 90° .

[1]

- (c) Find the length of QT .

[2]

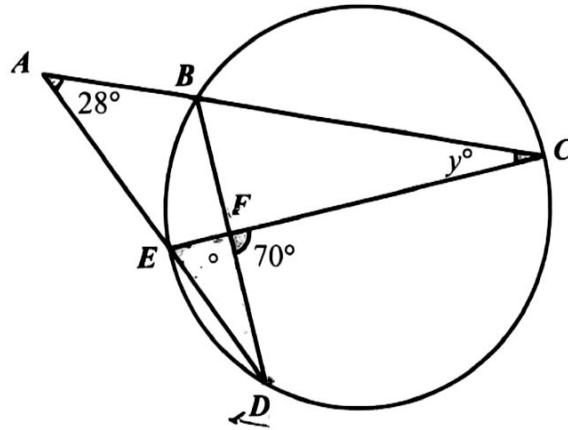
- (d) Point K lies on the circle so that triangle RKT is congruent to triangle PKT .
On the diagram, mark with a cross, ONE possible position for the point K .

[1]

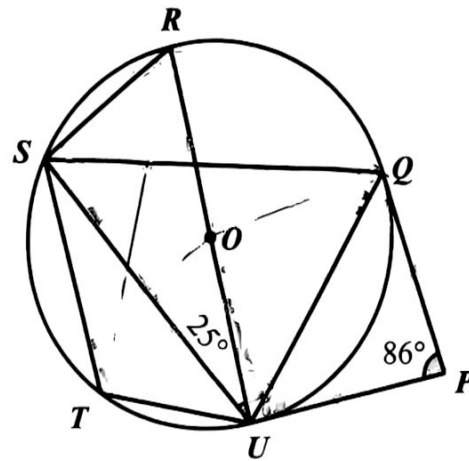
- 5 In the diagram, points B , C , D and E are points on the circumference of the circle.
 AED , ABC , BFD and EFC are straight lines.

Given that angle $EAB = 28^\circ$, angle $DFC = 70^\circ$, angle $FED = x^\circ$ and angle $FCB = y^\circ$,
 find the value of x and of y , stating your reasons clearly.

[4]



- 6 Q, R, S, T and U are points on the circle with centre O . PQ and PU are tangents to the circle, and ROU is a straight line. It is given that angle $QPU = 86^\circ$ and angle $SUO = 25^\circ$.



- (a) Find each of the following, stating your reasons clearly.

(i) $\angle QUP$,

[2]

(ii) $\angle QSU$,

[2]

(iii) $\angle SQU$,

[3]

(iv) $\angle STU$

[2]

- 6 (b) Given that M is the mid-point of SU and $OM = 8$ cm, find the radius of the circle. [2]

- (c) Jane claims that a circle of diameter QU will pass through the point O . Do you agree with Jane? Explain your reasoning. [3]

END OF PAPER