Unit 2

# Geometry and Measurement

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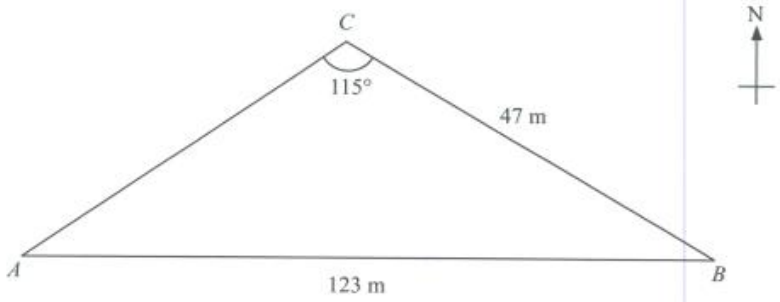
## 2.4 Applications of Trigonometry

Answer **all** questions. Show your workings clearly in the space provided.

1. In the diagram below, $A$, $B$ and $C$ are 3 points on level ground such that $A$ is due west of $B$. It is given that $AB = 123$ m, $BC = 47$ m and $\angle ACB = 115°$.




Find

(a) the bearing of $C$ from $A$,

(b) the bearing of $A$ from $C$,

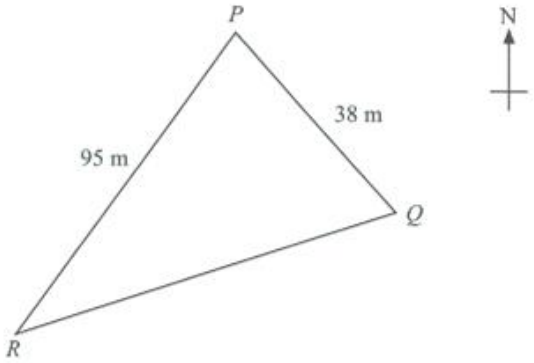
(c) the bearing of $C$ from $B$.

Answer: (a) _____ [3]

(b) _____ [1]

(c) _____ [1]

2. In the diagram, $P$, $Q$ and $R$ are 3 points on level ground. It is given that $PQ = 38$ m, $PR = 95$ m, the bearing of $R$ from $Q$ is 240° and the bearing of $P$ from $Q$ is 323°.




Find

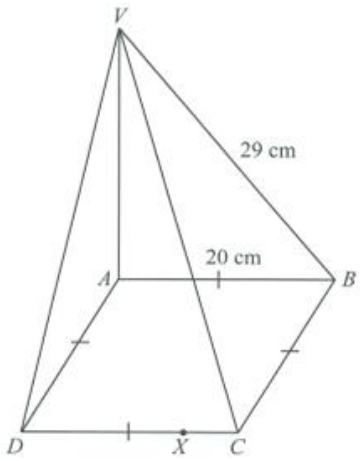
(a) the bearing of $Q$ from $P$,

(b) the bearing of $P$ from $R$.

Answer: (a) _____ [1]

(b) _____ [4]

3. The diagram below shows a pyramid with a square base $ABCD$ where $V$ is vertically above $A$. It is given that $AB = 20$ cm, $VB = 29$ cm and $X$ is a point on $DC$ such that $DX = \frac{3}{4}DC$.




Find

(a) $VA$,

(b) $VX$,

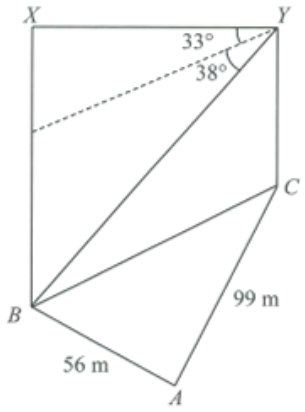
(c) $\angle XAC$.

Answer: (a) _____ [1]

(b) _____ [2]

(c) _____ [3]

4. In the diagram, $A$, $B$ and $C$ are three points on level ground while $XB$ and $YC$ represent two vertical towers. It is given that $AB = 56$ m, $AC = 99$ m, the angle of depression of $B$ from $Y$ is 38°, the angle of elevation of $X$ from $Y$ is 33° and the area of $\triangle ABC$ is 2760 m².




Find

(a) $\angle BAC$, given that $\angle BAC$ is an acute angle,

(b) $BC$,

(c) the shortest distance from $C$ to $AB$,

(d) the height of the taller tower, $XB$.

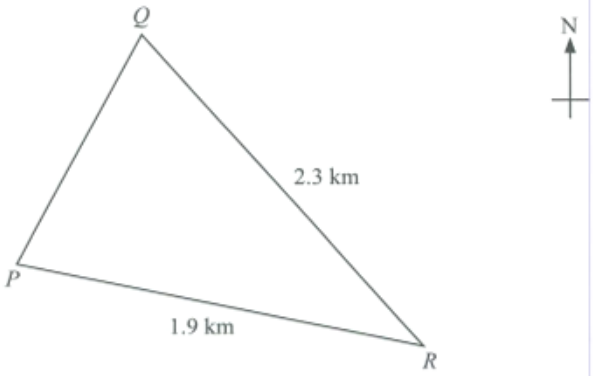
Answer: (a) _____ [2]

(b) _____ [2]

(c) _____ [2]

(d) _____ [3]

5. In the diagram below, $P$, $Q$ and $R$ are 3 points on level ground. It is given that $PR = 1.9$ km, $QR = 2.3$ km, the bearing of $R$ from $P$ is 102° and the bearing of $P$ from $Q$ is 215°.




(a) Solve for $\angle QPR$.

(b) Find the area of the triangle formed by the points $P$, $Q$ and $R$.

(c) There is a vertical tower at point $Q$ while $PR$ is a walkway. Kathy started walking from $P$ to $R$ and she reached a point on the walkway where the angle of elevation of the tower is the greatest. Given that this angle is 16°, find the height of the tower in metres.

(d) Find the time taken for Kathy to walk to this point if her average walking speed is 4.8 km/h. Give your answer in minutes and seconds, correct to the nearest second.

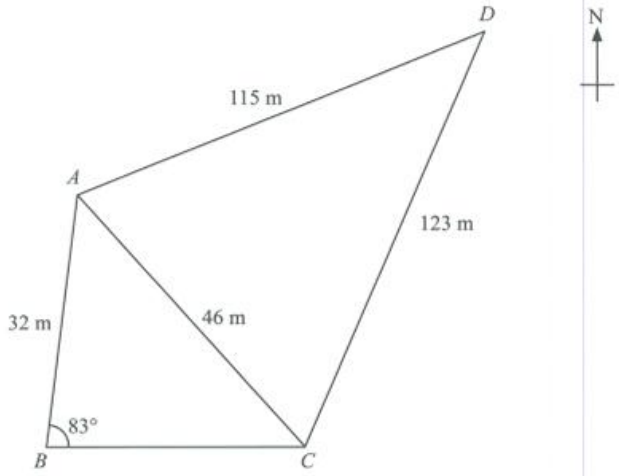
Answer: (a) _____ [1]

(b) _____ [4]

(c) _____ [4]

(d) _____ [3]

6. The diagram below shows 4 points ($A$, $B$, $C$ and $D$) on level ground. It is given that $AB = 32$ m, $AC = 46$ m, $AD = 115$ m, $CD = 123$ m, $\angle ABC = 83°$ and $C$ is due east of $B$.




(a) Find
   (i) the bearing of $B$ from $A$,
   (ii) $\angle BAC$,
   (iii) the largest angle in $\triangle ADC$,
   (iv) area of the quadrilateral $ABCD$.

(b) A helicopter, $H$ is flying vertically above $D$ such that the angle of depression of $A$ from $H$ is 27°. Find the angle of elevation of $H$ from $C$.

Answer: (a)(i) _____ [1]

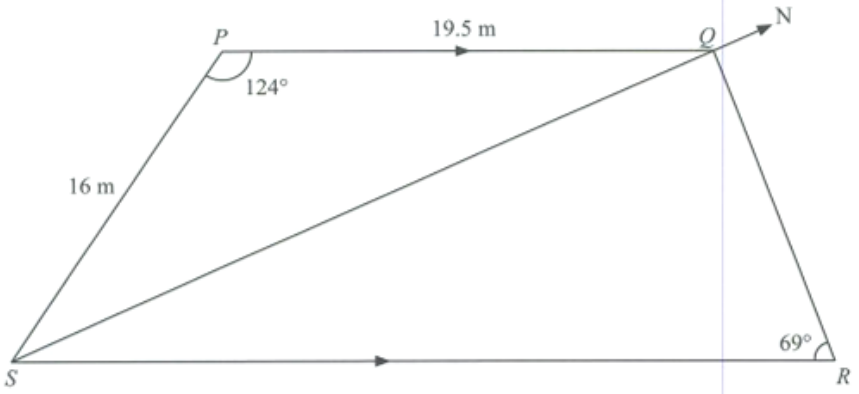
(ii) _____ [3]

(iii) _____ [3]

(iv) _____ [2]

(b) _____ [3]

7. In the diagram, $P$, $Q$, $R$ and $S$ are four points on level ground such that $PQ$ is parallel to $SR$. It is given that $PS = 16$ m, $PQ = 19.5$ m, $\angle SPQ = 124°$, $\angle SRQ = 69°$ and $Q$ is due north of $S$.




Find

(a) (i) $SQ$,
(ii) $\angle QSR$,
(iii) the bearing of $Q$ from $R$,
(iv) $QR$,
(v) area of $PQRS$.

(b) A helicopter, $H$, is vertically above $Q$ such that the angle of depression of $P$ from $H$ is 53°. Find the greatest angle of elevation of $H$ from a point along $SR$.

Answer: (a)(i) _____ [2]

(ii) _____ [3]

(iii) _____ [2]

(iv) _____ [2]

(v) _____ [2]

(b) _____ [3]