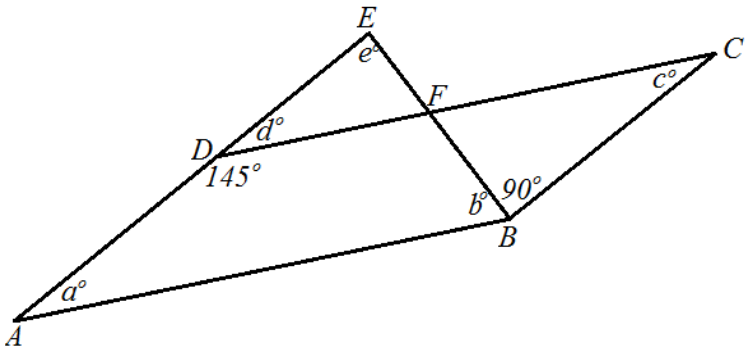
2018 Year 10 math topic test: Geometry

Q1 In the following diagram quadrilateral $ABCD$ is a parallelogram.
$\angle CBE$ is a right angle, and $\angle ADF = 145°$.



Give a reason for your answer to each of the following.

a. Find the value of e. 2 marks

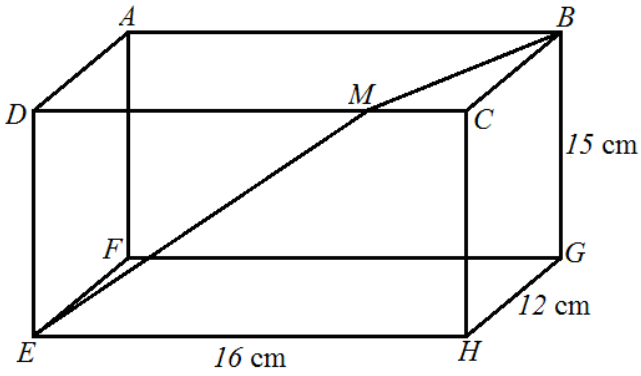
b. Find the value of d. 2 marks

c. Find the value of a. 2 marks

d. Find the value of c. 2 marks

e. Find the value of b. 2 marks

Q2 Consider the following three dimensional figure $ABCDEFGH$. It is called a cuboid where the six faces are all rectangles.
The side measures are shown in the diagram, and $\angle CMB = \angle DME$. The diagram is not drawn to scale.



a. ΔCMB and ΔDME are similar. Explain. 2 marks

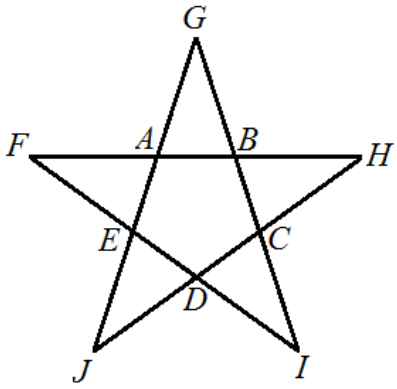
b. Determine the length ratio $DM : MC$. 2 marks

c. Find the exact length (in cm) of line segment DM in fraction form. 2 marks

d. BME is the shortest route from B to E. Explain. 2 marks

e. Find the shortest distance from B to E. 2 marks

Q3 The following diagram shows a **regular** star $AGBHCIDJEF$. The straight lines form a regular pentagon and many isosceles triangles.



a. How many isosceles triangles are there in the diagram? 1 mark

b. Write down any two congruent triangles. 1 mark

c. Write down any two similar triangles. 1 mark

d. Calculate the sum (in degrees) of the interior angles of the pentagon. 2 marks

e. Write down the sum (in degrees) of the exterior angles of the pentagon. 1 mark

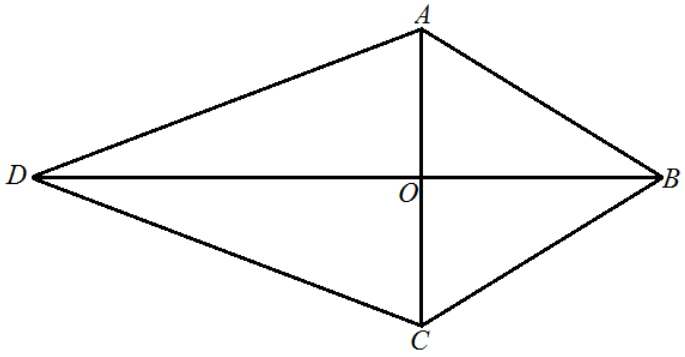
f. Draw 5 straight lines on the diagram above to form a second pentagon, and show that the magnitude of an interior angle of the second pentagon is $108°$.

2 marks

g. Show that the 2 straight lines forming a sharp vertex of the regular star trisect the interior angle of the second pentagon.

2 marks

Q4 A kite has 2 pairs of equal sides. Quadrilateral $ABCD$ shown below is a kite.
Sides AB and CB are equal, and sides AD and CD are also equal.
Diagonals AC and BD intersect at O.



a. Explain why $\angle OAB$ and $\angle OCB$ are equal. 1 mark

b. Explain clearly why ΔABD and ΔCBD are congruent. 2 marks

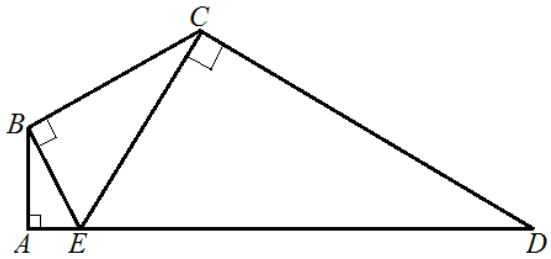
c. Explain why $\angle ABD$ and $\angle CBD$ are equal. 1 mark

d. Explain why diagonals AC and BD are perpendicular. 2 marks

Now consider ΔABC in the diagram above as an equilateral triangle, and $\angle ADC = 50°$.

e. Calculate the magnitude of $\angle BAD$ in degrees. 2 marks

Q5 The three right-angled triangles are similar in the following diagram. $ABCD$ is a quadrilateral.



a. Determine the magnitude of $\angle DEC$ in degrees. 1 mark

b. Determine the value of the length ratio $EA : EB$. 2 marks

c. Write down the value of each of the length ratios, $EB : EC$ and $EC : ED$. 2 marks

The length of line segment ED is 24 cm.

d. Determine the length of line segment AD. 2 marks

e. Determine the exact perimeter of the quadrilateral $ABCD$. Express your answer with surds. 3 marks

f. Determine the exact area of the quadrilateral $ABCD$. Express your answer with surds. 2 marks

