

Lesson 5

GCSE Mathematics Angles & Polygons

5.1 Investigating Regular Polygons

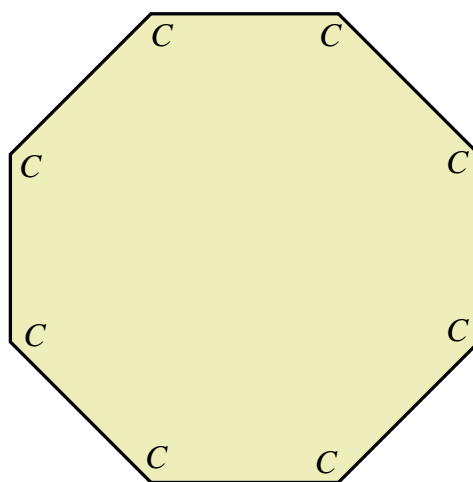
A regular polygon is one in which

- All sides are equal
- All interior angles are equal

For example, this regular polygon has

- Eight sides that are all the same length and
- Eight interior angles, C

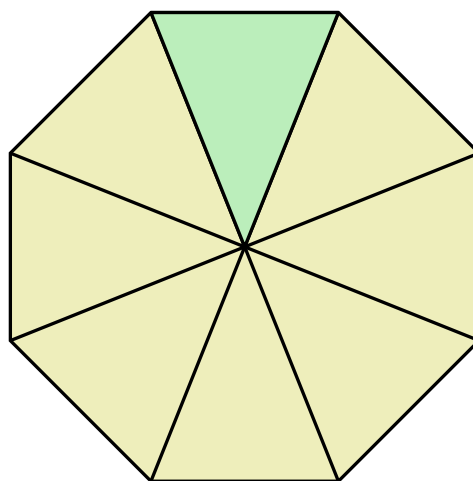
It's a regular octagon.



It's often helpful, if they are not already drawn, to add in spokes.

The result for the regular octagon is eight congruent isosceles triangles.

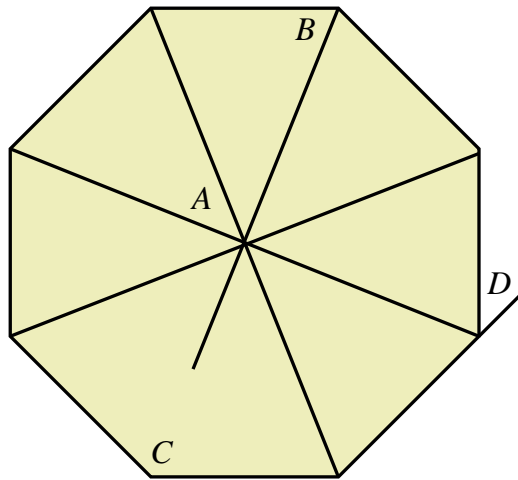
One of these isosceles triangles is shaded green.



With these basics in mind, we're all set to investigate the regular polygons.

5.2 Investigating the Regular Octagon

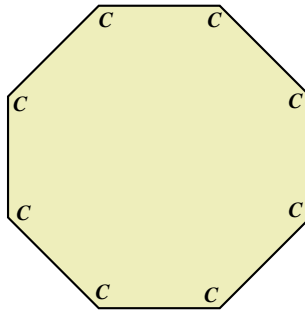
Teaching Video: <http://www.NumberWonder.co.uk/v9034/5.mp4>



- (a) For the eight sided regular polygon shown above, state the size of
- (i) angle A
 - (ii) angle B
 - (iii) *interior* angle, C
 - (iv) *exterior* angle, D

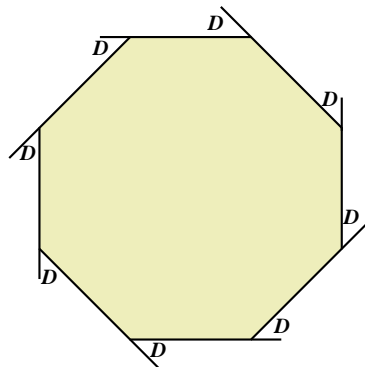
[4 marks]

- (b) What do the eight *interior* angles of the polygon sum to ?



[1 mark]

- (c) What do the eight *exterior* angles of the polygon sum to ?

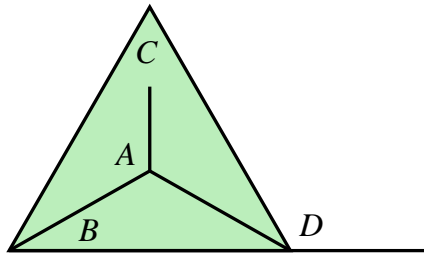


[1 mark]

5.3 Exercise

You may use a calculator
Marks Available : 40

Question 1



- (a) What is a three sided regular polygon called ?

[1 mark]

- (b) For the three sided regular polygon shown above, state the size of

(i) angle A

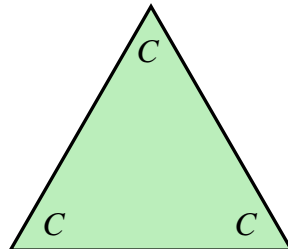
(ii) angle B

(iii) *interior* angle, C

(iv) *exterior* angle, D

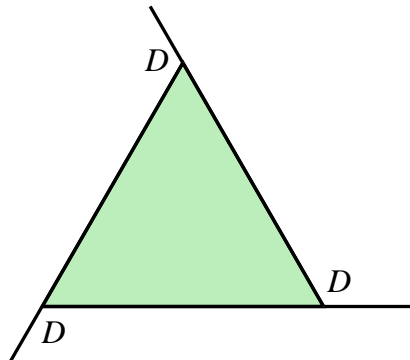
[4 marks]

- (c) What do the three *interior* angles of the regular polygon sum to ?



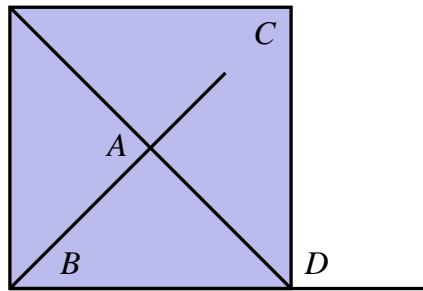
[1 mark]

- (d) What do the three *exterior* angles of the regular polygon sum to ?



[1 mark]

Question 2



(a) What is a four sided regular polygon called ?

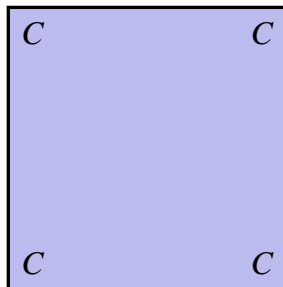
[1 mark]

(b) For the four sided regular polygon shown above, state the size of

- (i) angle A
- (ii) angle B
- (iii) *interior* angle, C
- (iv) *exterior* angle, D

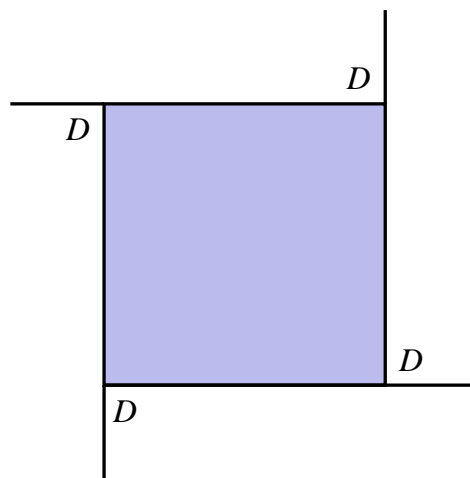
[4 marks]

(c) What do the four *interior* angles of the regular polygon sum to ?



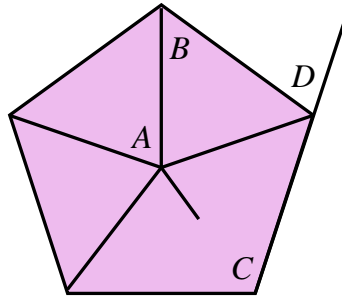
[1 mark]

(d) What do the four *exterior* angles of the regular polygon sum to ?



[1 mark]

Question 3



(a) What is a five sided polygon called ?

[1 mark]

(b) For the five sided regular polygon shown above, state the size of

(i) angle *A*

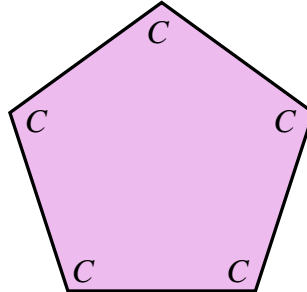
(ii) angle *B*

(iii) *interior* angle, *C*

(iv) *exterior* angle, *D*

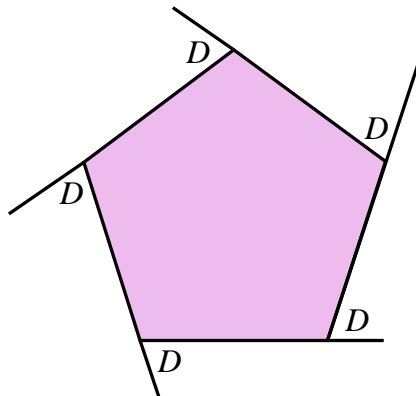
[4 marks]

(c) What do the five *interior* angles of the polygon sum to ?



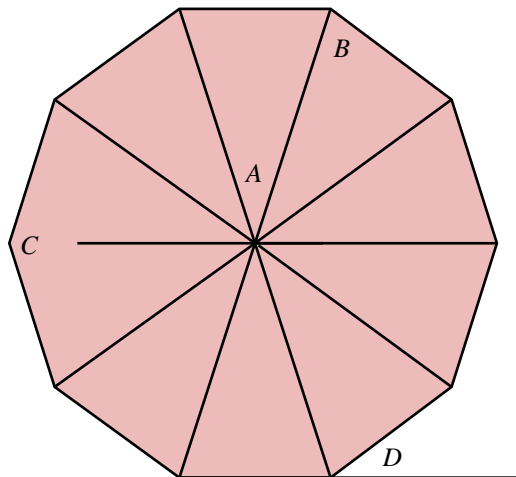
[1 mark]

(d) What do the five *exterior* angles of the polygon sum to ?



[1 mark]

Question 4



(a) What is a ten sided polygon called ?

[1 mark]

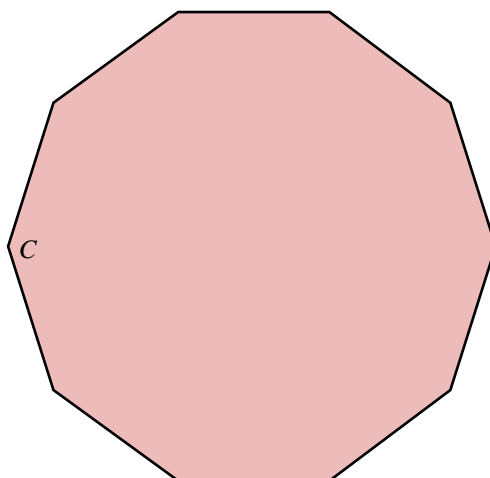
(b) For the ten sided regular polygon shown above, state the size of

- (i) angle A
- (ii) angle B
- (iii) *interior* angle, C
- (iv) *exterior* angle, D

[4 marks]

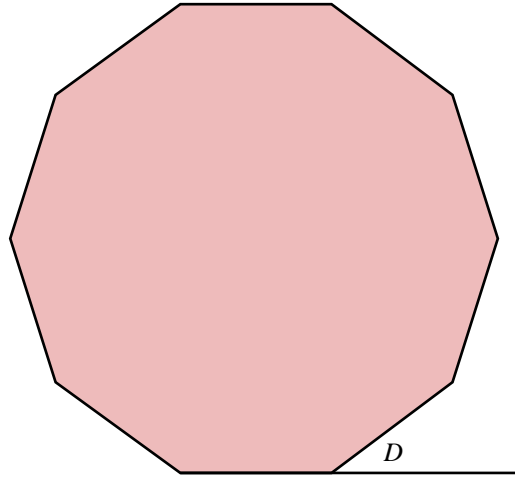
(c) One *interior* angle is marked on the diagram below.

- (i) On the diagram mark each of the other nine *interior* angles with a C
- (ii) What do the ten *interior* angles of the polygon sum to ?



[3 marks]

- (d) One *exterior* angle is marked on the diagram below.
- (i) On the diagram mark each of the other nine *exterior* angles with a *D*
- (ii) What do the ten *exterior* angles of the polygon sum to ?



[3 marks]

Question 5

Complete the following table to summarize the answers to questions 1, 2, 3 and 4

Question	N° of sides	Polygon Name	Each Interior	Each Exterior	Sum Interior	Sum Exterior
1						
2						
3						
Example	8	Octagon	135°	45°	1080°	360°
4						

[8 marks]

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Teachers may obtain detailed worked solutions to the exercises by email from mhh@shrewsbury.org.uk