Mathematics
June 2018 Paper 3 (Calculator Allowed)
Part 2 (Second half of the paper)
Edexcel Higher Tier

Time: 45 minutes

Q	Topic	Max Mark	My Marks
13	Similar Shapes Area and Volume	3	
14	The Product Rule for Counting	2	
15	Velocity Time Graphs, Area Under a Graph	4	
16	Quadratic Sequences, Quadratic Nth Term	6	
17	Sine Rule, Cosine Rule	5	
18	Iteration	6	
19	Solving Algebraic Fractions	5	
20	Venn Diagrams, Conditional Probability	5	
21	Congruent Triangles	5	
	Total	41	

13 Here are two similar solid shapes.

A   B

surface area of shape **A** : surface area of shape **B** = 3 : 4

The volume of shape **B** is $10 \, cm^3$

Work out the volume of shape **A**.
Give your answer correct to 3 significant figures.

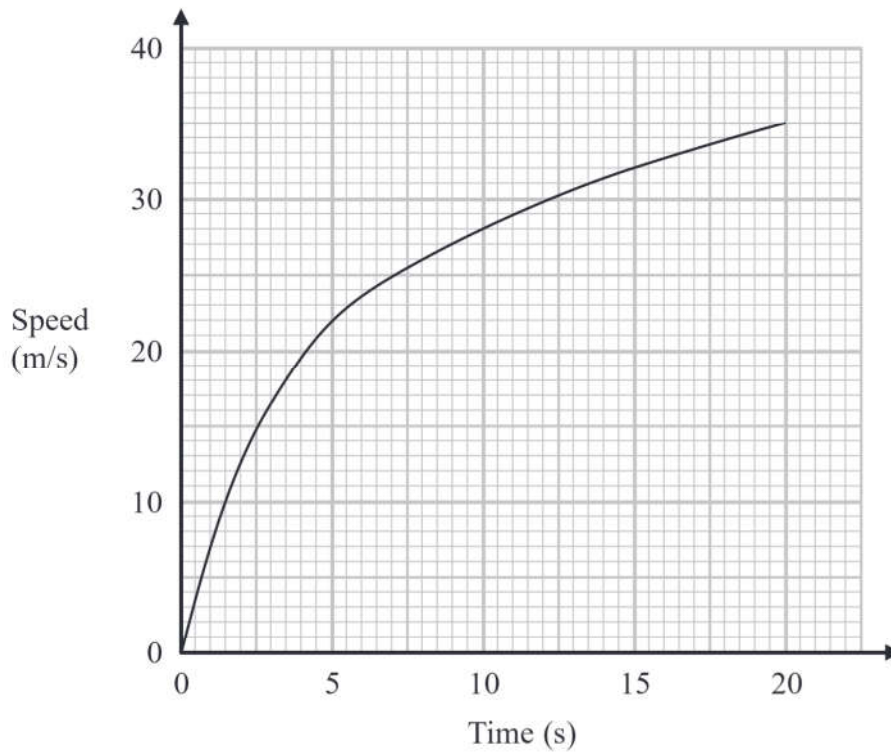.. cm^3

(Total for Question 13 is 3 marks)

14 There are 16 hockey teams in a league.
Each team played two matches against each of the other teams.

Work out the total number of matches played.

....

(Total for Question 14 is 2 marks)

Turn over ▶

15 The graph shows the speed of a car, in metres per second, during the first 20 seconds of a journey.

(a) Work out an estimate for the distance the car travelled in the first 20 seconds.
Use 4 strips of equal width.

.... metres

(3)

P 4 8 8 6 4 A 0 1 6 2 4

(b) Is your answer to part (a) an underestimate or an overestimate of the actual distance the car travelled in the first 20 seconds?
Give a reason for your answer.

....

....

(1)

(Total for Question 15 is 4 marks)

16 The *n*th term of a sequence is given by $an^2 + bn$ where *a* and *b* are integers.

The 2nd term of the sequence is –2
The 4th term of the sequence is 12

(a) Find the 6th term of the sequence.

....

(4)

Here are the first five terms of a different quadratic sequence.

<div align="center">

0   2   6   12   20

</div>

(b) Find an expression, in terms of *n*, for the *n*th term of this sequence.

....

(2)

(Total for Question 16 is 6 marks)

17

A

11.4 cm

86° *B*

109°

34° *C*

12.5 cm

D
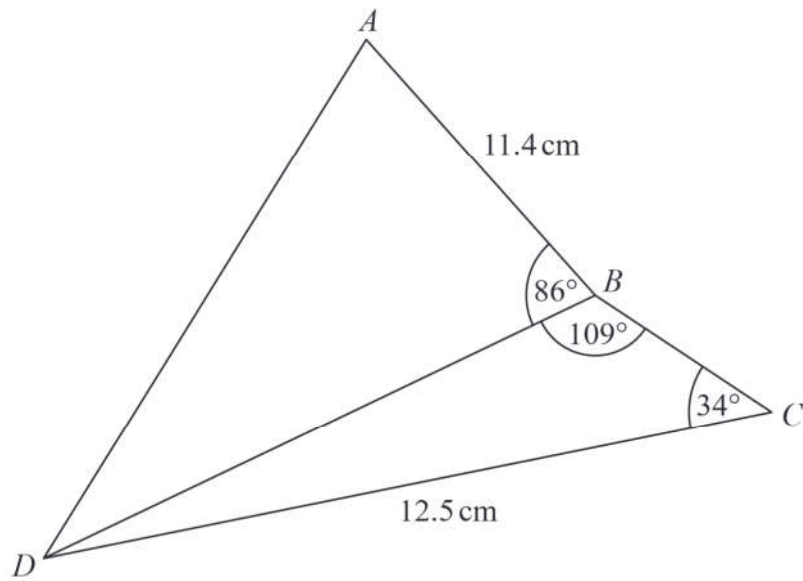
Work out the length of *AD*.
Give your answer correct to 3 significant figures.

.... cm

(Total for Question 17 is 5 marks)

18 (a) Show that the equation $x^3 + x = 7$ has a solution between 1 and 2

(2)

(b) Show that the equation $x^3 + x = 7$ can be rearranged to give $x = \sqrt[3]{7 - x}$

(1)

(c) Starting with $x_0 = 2$,
use the iteration formula $x_{n+1} = \sqrt[3]{7 - x_n}$ three times to find an estimate for a solution of $x^3 + x = 7$
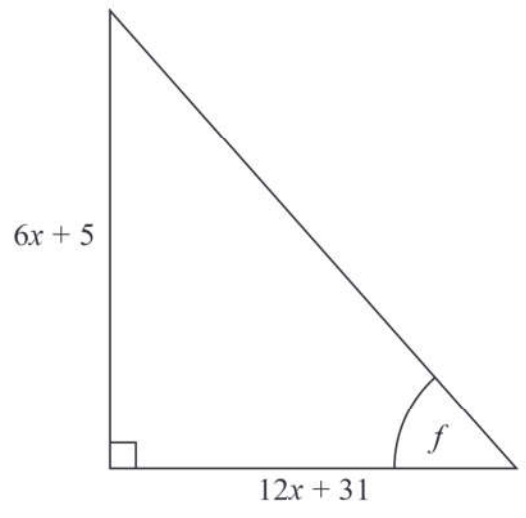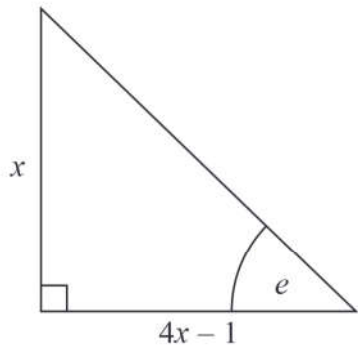
(3)

(Total for Question 18 is 6 marks)

19 Here are two right-angled triangles.

Given that

$$\tan e = \tan f$$

find the value of x.

You must show all your working.

....

(Total for Question 19 is 5 marks)

Turn over ▶

20 50 people were asked if they speak French or German or Spanish.

Of these people,
  31 speak French
  2 speak French, German and Spanish
  4 speak French and Spanish but not German
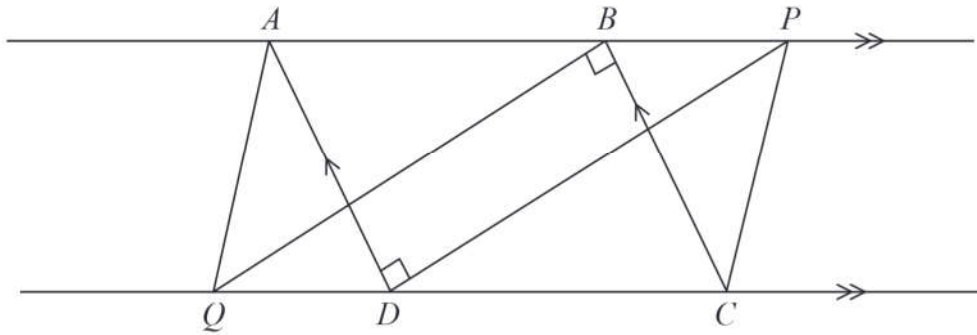 7 speak German and Spanish
  8 do not speak any of the languages
  all 10 people who speak German speak at least one other language

Two of the 50 people are chosen at random.

Work out the probability that they both only speak Spanish.

....

(Total for Question 20 is 5 marks)

21

ABCD is a parallelogram.
ABP and *QDC* are straight lines.
Angle *ADP* = angle *CBQ* = 90°

(a) Prove that triangle *ADP* is congruent to triangle *CBQ*.

(3)

(b) Explain why *AQ* is parallel to *PC*.

(2)

(Total for Question 21 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS