RAQ (Advanced Qualifications)

Mathematics
Root level
Paper 1

∞ hours

Instructions to candidates

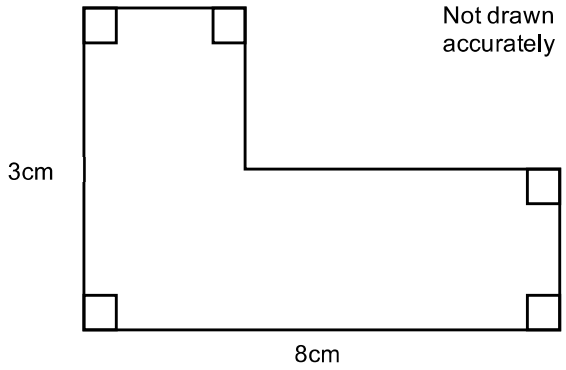
- Do not open this examination paper until instructed to do so.
- You are permitted access to any calculator for this paper.
- Write your answers in the spaces provided on the question paper.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place.
- Answer **all** questions.

- The maximum mark for this examination paper is **[51 marks]**.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
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11	
12	
TOTAL	

1 James says, "There is not enough information to find the perimeter or area of this shape."

Is he correct?

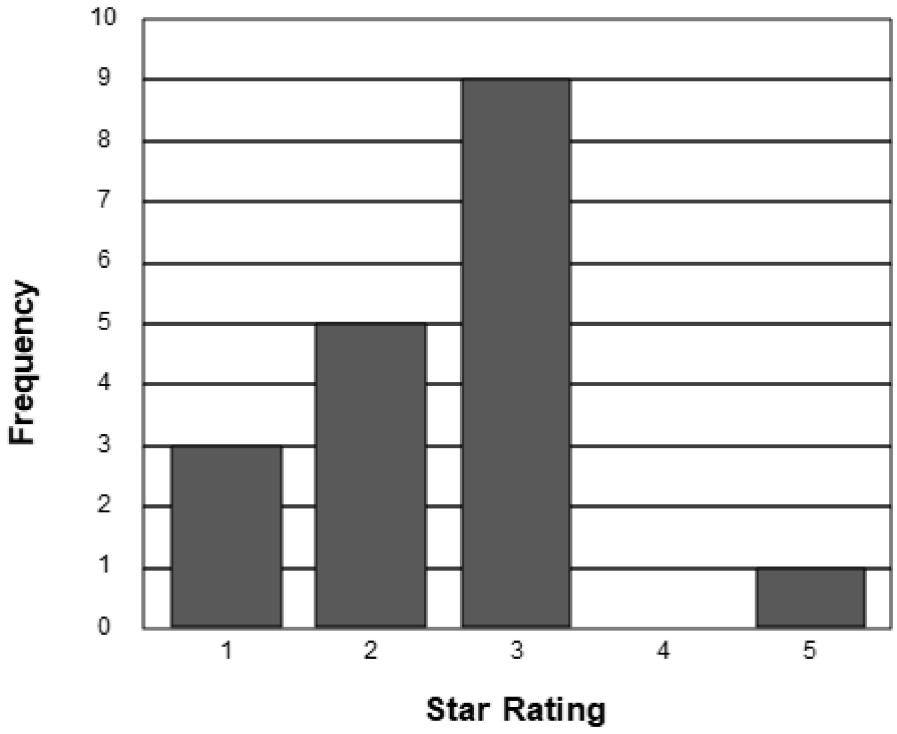


[2 marks]

2 The graph shows the ratings of a product received on an online shopping website.

The bar for 4 stars is missing.

If the mean rating is 2.65, use the information to complete the graph.



[2 marks]

3 The sum of 2 angles about a point is 360°.
Noah says, "If we increase the small angle by 10% and decrease the reflex angle by 10%, they will still add to 360°".
Explain why Noah is both right and wrong.

(2)

.....

.....

.....

.....

4 A square has an area of 81cm^2.
A rectangle has the same perimeter as the square.
The rectangle's length and width are in the ratio 2:1.
Find the area of the rectangle.

(3)

Answer = ... cm^2

5 Charles and Alice have £10 altogether.
Alice has £1.60 more than Charles.
Charles spends one third of his money.
(a) How much money is Charles left with?

(2)

Answer = £ .....

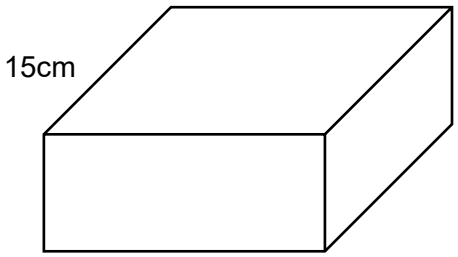
Difficulty: **Medium**

(b) How much money do Charles and Alice now have in total?

(1)

Answer = £ .....

6 A block of ready-made pastry is a cuboid measuring 10cm by 15cm by 3cm.



Not drawn accurately

Freddie is making 12 pies for a charity event.
For each pie, he needs to cut a circle of pastry with a diameter of 18cm from a sheet of pastry 0.5cm thick.
(a) How many blocks of pastry will Freddie need to buy?

(4)

Answer = ...

Each block of ready-made pastry costs £10.99.

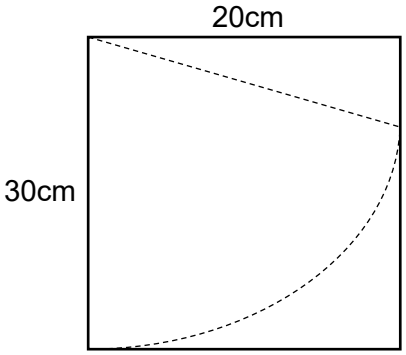
(b) How much money has Freddie wasted?

(2)

Answer = £ .....

Difficulty: **Medium**

7 Tyler wants to cut a sector of radius 30cm from a piece of paper measuring 30cm by 20cm.



Not drawn accurately

What percentage of the paper will be wasted?
Give your answer as an exact decimal value.

(4)

Answer = ...

8 A triangle has sides $(x + 4)$cm, $(2x + 6)$cm and $(3x - 2)$cm. Its perimeter is 80cm.

Show that the triangle is right angled.

(3)

Difficulty: **Hard**

9 Luke buys 5 tins of paint and 4 rolls of decorating tape. The total cost was £167.

The next day he returns 1 unused tin of paint and 1 unused roll of tape. The refund amount is exactly enough to buy a fan heater on sale for 10% off.

The regular cost of the fan heater is £37.50.
Find the cost of a tin of paint.

(3)

Answer = £ .....

10 A printing factory is making exam papers. When all 10 printers are working, the factory can finish in 12 days. Each printer prints 1 exam paper per day.

For the first 2 days, 3 printers are broken. On the third day, 2 more printers break, so only 5 printers are working. After a total of 5 days, all broken printers are fixed, and all 10 printers can print the remaining exam papers.
How many days in total does it take the factory to produce all of the exam papers?

(6)

Answer = ...

Difficulty: **Insane**

11 Roshie is competing in a triathlon.
A triathlon consists of a 5km swim, 40km cycle and 10km run.
Roshie wants to complete the triathlon in 5 hours.

He knows he can swim at an average speed of 2.5km/h and cycle at an average speed of 25km/h.

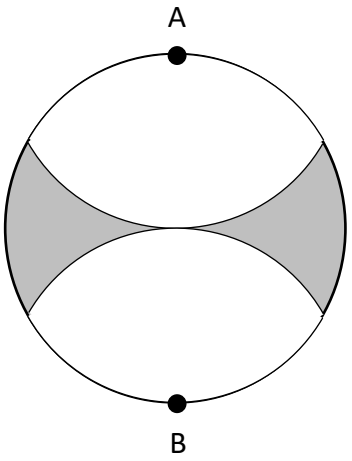
In between each event, Roshie takes a 4 minute break.
What speed must Roshie average on the final run to finish the triathlon in 5 hours?

(5)

Answer = ... m/s

Difficulty: **Hard**

12 A cross section of a ball shows a circle and two equal lunes.
A and B are centers of imaginary circles, such that the primary arc of each lune forms a segment of these circles.



Not drawn accurately

(a) Construct a function, where r is the radius of the cross section of a similar ball, to calculate the total area of the two shaded regions.
Give your answer in its simplest form.

(10)

TURN OVER

Difficulty: Unreal

$f(r)$ = ...

(b) Using your function, calculate the area of the two unshaded regions in a similar cross section of a ball with radius 5cm.
Give your answer to 2 decimal places.

(2)

Answer = ... cm^2

END OF QUESTIONS

Difficulty: Unreal