"BETWEEN PAPERS" PRACTICE
(Higher only)

Summer 2018

QUESTIONS

Not A "best" Guess paper.

Neither is it a "prediction" ... only the examiners know what is going to come up! Fact!
You also need to REMEMBER that just because a topic came up on paper 1 it may still come up on papers 2 or 3 ...

We know how important it is to practice, practice, practice .... so we've collated a load of questions that weren't examined in the OCR 9-1 GCSE Maths paper 1 but we cannot guarantee how a topic will be examined in the next papers ...

Enjoy!
Mel & Seager

Q1. Lei is in a class of 28 students, 3 of whom are left-handed.
There are 1250 students in the school.

a) Use this information to estimate how many students in the school are left-handed.

a) .... [3]

b) Is your solution to (a) likely to be an overestimate or an underestimate? Explain your reasoning.

[1]

Q2 a) Write down the reciprocal of 8.

a) .... [1]

b) Work out the value of k .

$4^5 \times 2^{-4} = 2^k$

b) .... [3]

Q3. Evaluate.

$$16^{-\frac{3}{2}}$$

.... [3]

Q4. A solid metal sphere has radius 9.8 cm.

The metal has a density of 5.023 g/cm^3.

Lynne estimates the mass of this sphere to be 20 kg.

Show that this is a reasonable estimate for the mass of the sphere.

[The volume V of a sphere with radius r is V $= \frac{4}{3}\pi r^3$]

[5]

Q5. a) y is directly proportional to $\sqrt{x}$

y is 75 when $x = 100$.

Find a formula linking x and y .

a) .... [3]

b) y is inversely proportional to x^2 and $y = 3$ when $x = 12$.

Show that $y = 27$ when $x = 4$.

[3]

Q6. Here are some properties of a number.

- It is a common factor of 288 and 360.
- It is a common multiple of 4 and 6.
- It is larger than 25.

Find the two possible numbers with these properties.

.... and .... [4]

Q7. a) Write $\frac{5}{11}$ as a recurring decimal.

[2]

c) Write $0.3\dot{6}$ as a fraction in its lowest term

[3]

Q7. Kamile sells sandwiches.

In May, she sold 400 sandwiches.

In June, Kamile sold 20% more sandwiches than in May.

In July, Kamile sold 15% fewer sandwiches than in June.

Calculate the percentage change in her sales from May to July.

.... % [5]

Q8 Sam and two friends put letters in envelopes on Monday. The three of them take two hours to put 600 letters in envelopes.

(a) On Tuesday Sam has three friends helping. Working at the same rate, how many letters should the four of them be able to put in envelopes in two hours?

(a) .... [2]

(b) Working at the same rate, how much longer would it take four people to put 1000 letters in envelopes than it would take five people?

(b) .... [4]

(c) Sam says: *It took two hours for three people to put 600 letters in envelopes. If I assume they work all day, then in one day three people will put 7200 letters in envelopes because 600 × 12 = 7200.*
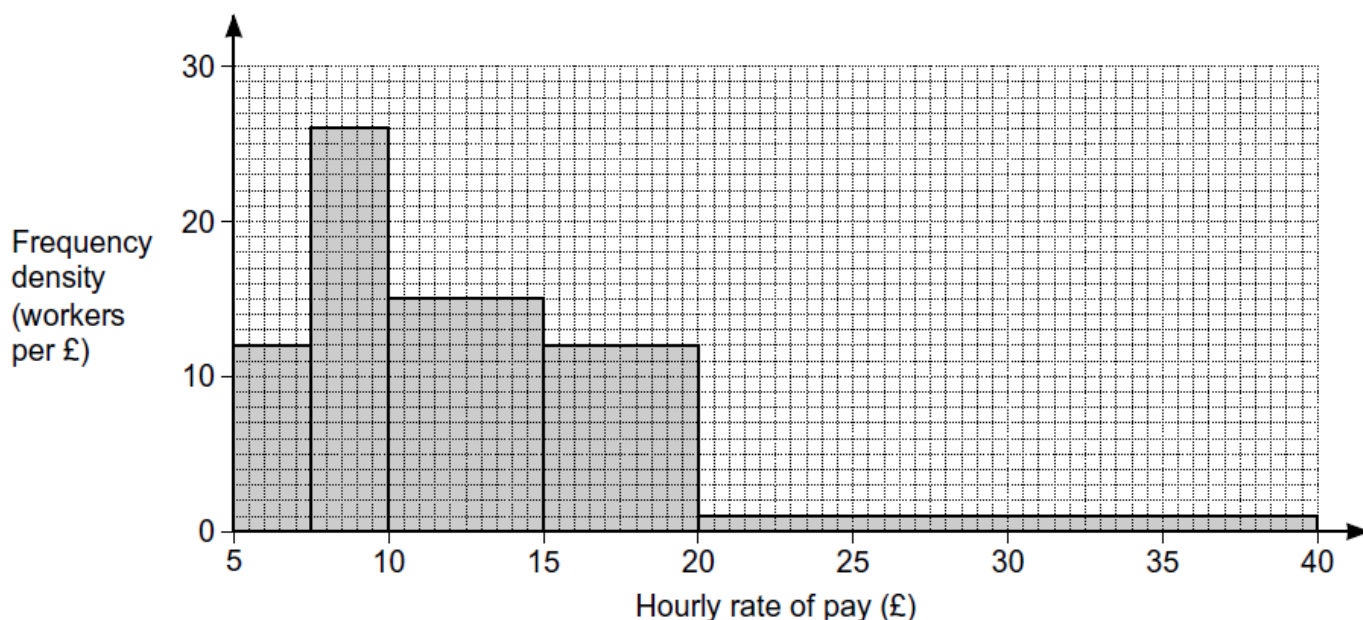
Why is Sam's assumption not reasonable?

What effect has Sam's assumption had on her answer?

[2]

Q9. Omar surveyed a group of workers to find their hourly rate of pay.

His results are summarised in the histogram.

a) Show that Omar surveyed 250 workers.

[3]

b) The UK living wage is £7.85 per hour.

A newspaper states that one fifth of workers earn less than the living wage.

i) Does Omar's survey support the statement in the newspaper?

Show how you decide.

[4]

ii) Explain why your calculations in part (b)(i) may not give the exact number of workers earning less than the living wage.

[1]

c) Omar used this table to record the ages of the people in his survey.

Age (a years)	$18 \leqslant a \leqslant 20$	$20 \leqslant a \leqslant 30$	$30 \leqslant a \leqslant 40$	$40 \leqslant a \leqslant 50$	$50 \leqslant a \leqslant 70$

Comment on one problem with his table.

[1]

Q10. A bag contains only red and blue marbles.

Yasmine takes one marble at random from the bag.

The probability that she takes a red marble is $\frac{1}{5}$.

Yasmine returns the marble to the bag and adds five more red marbles to the bag.

The probability that she takes one red marble at random is now $\frac{1}{3}$.

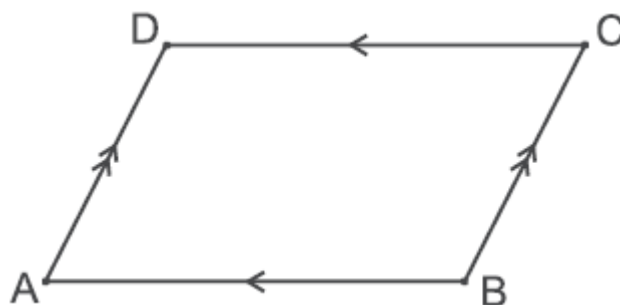How many marbles of each colour were originally in the bag?

.... red marbles

.... blue marbles [3]

Q11. Show that $\sqrt{20} = 2\sqrt{5}$

[2]

6. *ABCD* is a parallelogram.

Prove that triangle *ABD* is congruent to triangle *CDB*.

[3]

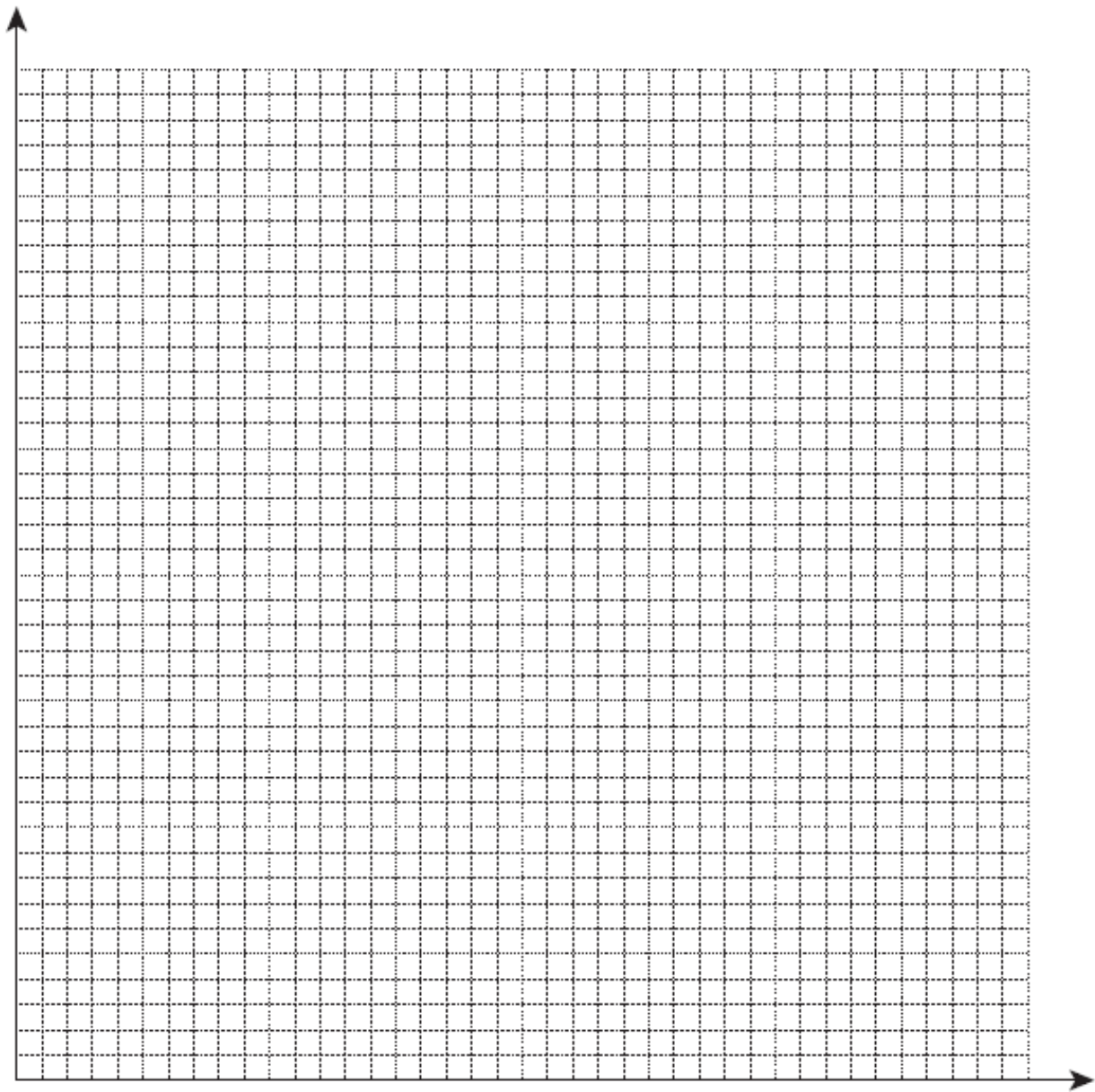**Q12.** The table shows the marks gained by 150 students taking an examination.

Mark (m)	0<m⩽10	10<m⩽20	20<m⩽30	30<m⩽40	40<m⩽50	50<m⩽60	60<m⩽70	70<m⩽80
Frequency	9	14	26	27	25	22	17	10

(a) (i) Construct a cumulative frequency table.

Mark (m)	m ⩽ 10	m ⩽ 20	m ⩽ 30	m ⩽ 40	m ⩽ 50	m ⩽ 60	m ⩽ 70	m ⩽ 80
Cumulative Frequency	9							150

[2]

(ii) Draw the cumulative frequency graph on the grid below.

[4]

(b) Students are to be awarded Gold, Silver, Bronze or Fail.

The students' teacher wishes to award the top 10% of students Gold, the next 60% Silver and the next 20% Bronze.

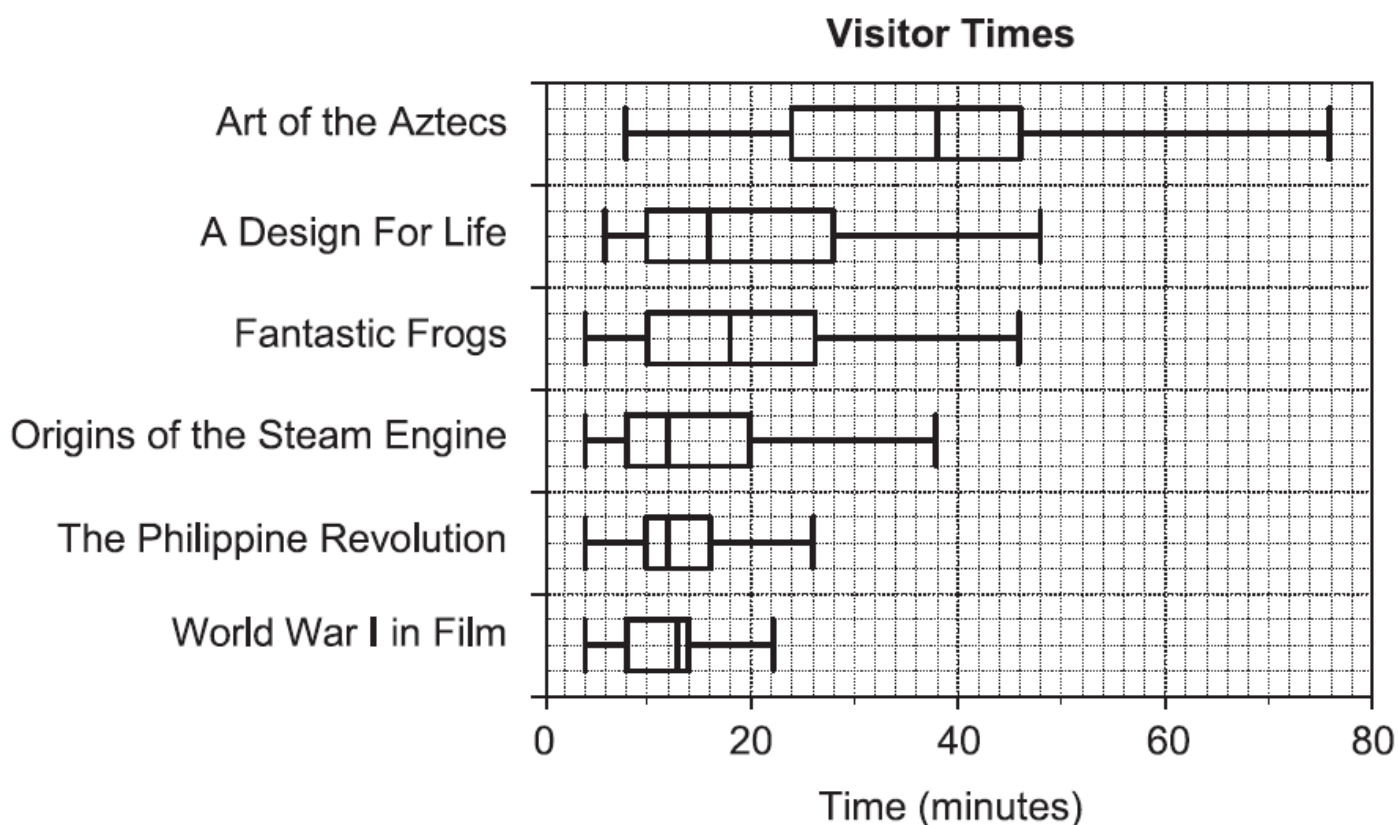Use your graph to estimate the lowest mark that Silver will be awarded for.

(b) .... [3]

(c) Explain why the teacher's method will not necessarily award Gold to exactly 10% of the students.

[1]

Q13. One day a museum monitored the time spent by visitors at six exhibitions.

The visitor times are summarised in the box plots below.

Visitor Times

a) Work out the range in visitor times at the Fantastic Frogs exhibition.

a) .... [2]

b) At which exhibition were visitor times the most consistent?

Give a reason for your answer.

[2]

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c) Give one similarity and one difference between the distributions of the visitor times for **Origins of the Steam Engine** and **The Philippine Revolution**.

Similarity

Difference

[2]

d) Is it possible to work out from the box plots which exhibition had the most visitors?

Justify your answer.

[2]

Q14. The table shows data for the UK about its population and the total amount of money spent on healthcare in 2002, 2007 and 2012.

Year	Population	Total spent on healthcare (£)
2002	5.94×10^7	8.14×10^{10}
2007	6.13×10^7	1.20×10^{11}
2012	6.37×10^7	1.45×10^{11}

a) How much more was spent on healthcare in 2007 than in 2002?

Give your answer in millions of pounds.

a) £ .... million [3]

b) Marcia says: The amount spent on healthcare per person in the UK doubled in 10 years.

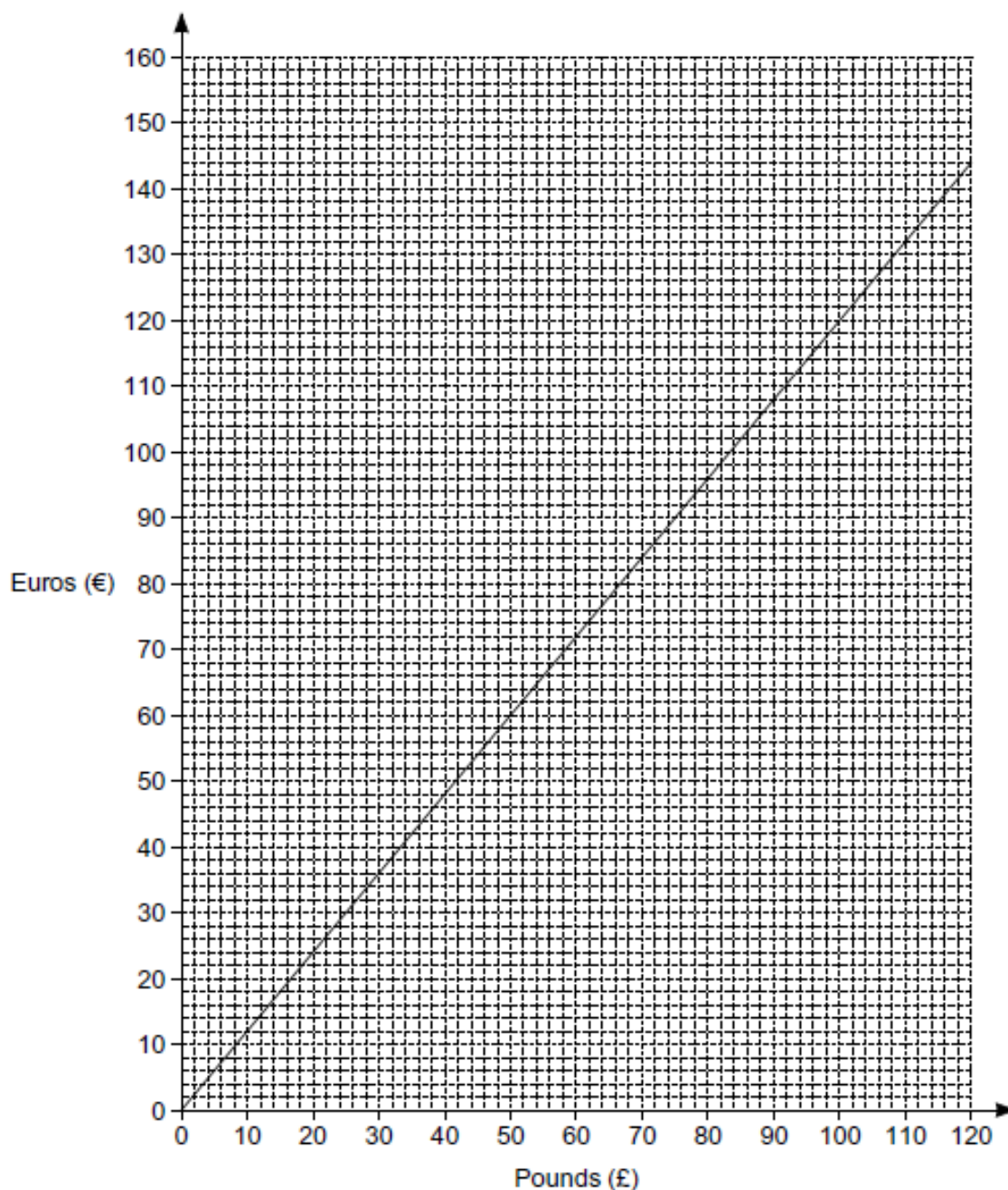Use the information in the table to comment on whether Marcia is correct.

[4]

Q15. The lengths of the sides of a right-angled triangle are all integers.

Prove that if the lengths of the two shortest sides are even, then the length of the third side must also be even.

[3]

Q16. This is a conversion graph between pounds and euros.

(a) Convert £36 into euros.

(a) € .... [1]

(b) (i) Convert €400 into pounds.

(i) £ .... [3]

(ii) State an assumption that you have made in working out your answer to part (i).

[1]

(c) Explain how the graph shows that the number of euros is directly proportional to the number of pounds.

[2]

Q17. Solve.

$$4x - 7 = 8 - 2x$$

x = ... [3]

Q18. Eddie and Caroline are going to the school play.

Eddie buys 6 adult tickets and 2 child tickets. He pays £39.

Caroline buys 5 adult tickets and 3 child tickets. She pays £36.50.

Work out the cost of an adult ticket and the cost of a child ticket.

Adult ticket £ ....

Child ticket £ .... [5]

Q19. Rearrange this formula to make x the subject.

$$y = \sqrt{4x - 3}$$

[3]

Q20. (a) (i) Solve.

$$5x + 1 > x + 13$$

(a)(i) .... [3]

(ii) Write down the largest integer that satisfies 5x - 1 < 10.

(ii) .... [1]

Q21. Safety rules on a campsite require Sarah to set up her barbecue at least 4 m from her tent.

She decides to measure this distance using her stride length.

Sarah knows that her stride length is 0.8 m, rounded to the nearest 0.1 m.

Find the minimum number of strides Sarah will need to take to guarantee that her barbecue is a safe distance from her tent.

.... [3]

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Q22. Three identical small circles are drawn inside one large circle, as shown in the diagram.

The centres of the small circles lie on the diameter of the large circle.

Find the fraction of the large circle that is shaded.
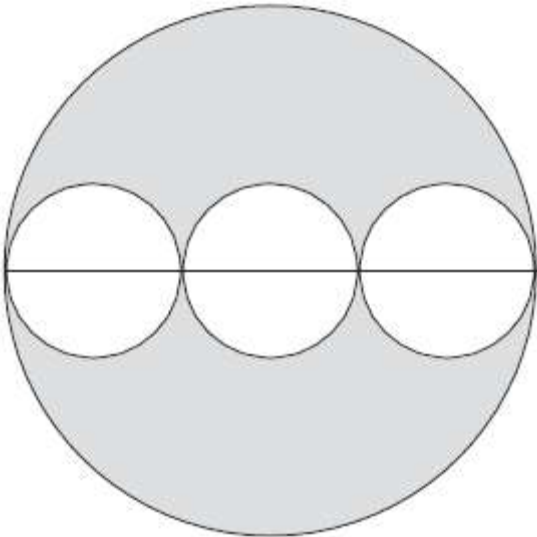
.... [3]

Q23. A bakery bakes small, medium and large pies.

The ratio small : medium : large is 3 : 5 : 2.

What fraction of the pies are large?

.... [1]

Q24. Calculate.

$$2\frac{3}{8} \div 1\frac{1}{18}$$

Give your answer as a mixed number in its lowest terms.

.... [3]

Q25. a) Complete the table for $y = x^3 - 6x - 5$.

x	0	1	2	3	4
y		-10	-9	4	

[2]

b) (i) Between which two consecutive integers is there a solution to the equation

$x^3 - 6x - 5 = 0$?

Give a reason for your answer.

A solution lies between x = ... and x = ...

Because ....

.... [2]

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(ii) Choose a value of x between the two values you gave in part (b)(i).

Calculate the corresponding value of y .

(b)(ii) x = ...

y = ... [2]

(iii) State a smaller interval in which the solution lies.

(iii) .... [1]

Q26. P, Q, R and S are the midpoints of OX, XY, YZ and OZ respectively.

$\overrightarrow{OP}$ = **a**, $\overrightarrow{XQ}$ = **b** and $\overrightarrow{OS}$ = **c**.
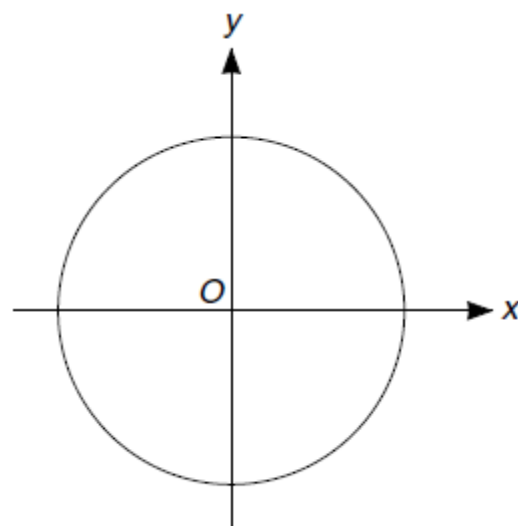
Show that PQ is parallel to SR.
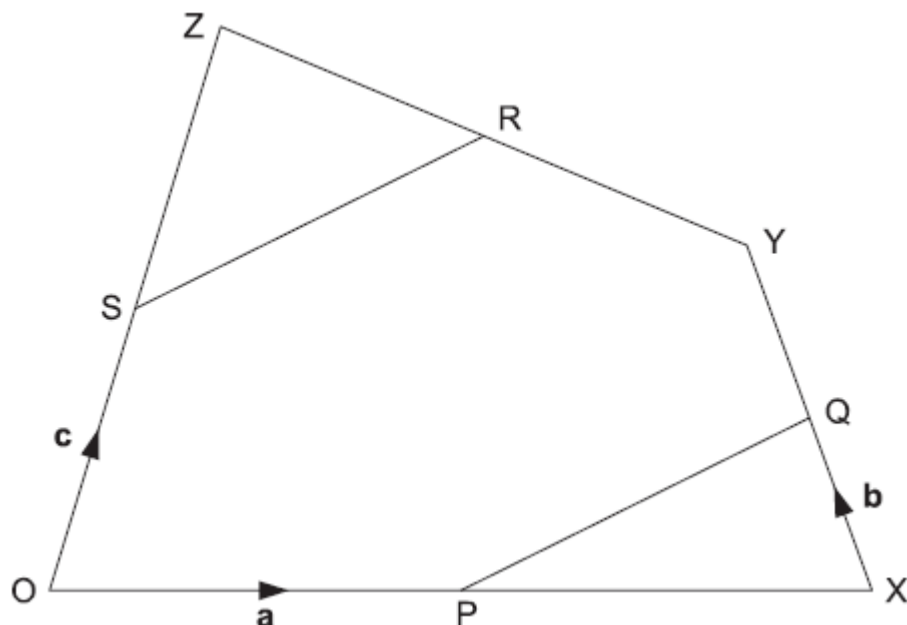
[5]

Q27. (a) The diagram shows a circle, centre O.

The circumference of the circle is 20π cm.

Find the equation of the circle.

a) .... [4]

b) The line 10x + py = q is a tangent at the point (5, 4) in another circle with centre (0, 0).

Find the value of p and the value of q.

b) p = ...

q = ... [4]

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