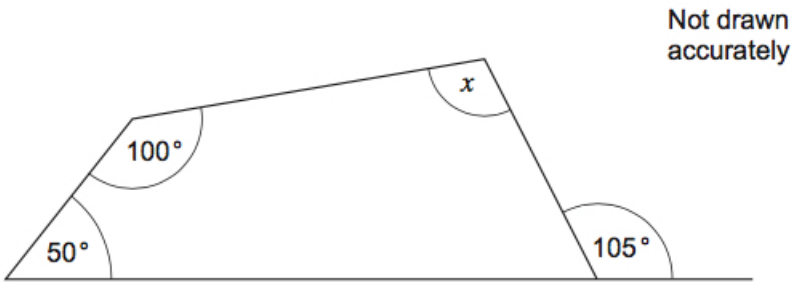
Dr Oliver Mathematics
AQA GCSE Mathematics
2012 November Paper 2: Calculator
2 hours

The total number of marks available is 105.
You must write down all the stages in your working.

1. Work out the value of x. (3)



2. Here are Jon's marks in two tests. (3)

Test A	18 out of 25
Test B	30 out of 40

Which test gives the higher percentage mark?
You **must** show your working.

3. Solve (4)

$$3(2x + 4) + 8 = 50.$$

4. (a) Put each of these numbers into the correct box. (3)

27 2 8 11 64

	Square Number	Odd Number	Even Number
Cube Number			
Prime Number			

(b) Why is it **never** possible to put any number in the Prime Number & Square Number? (1)

5. (3)

$$A = \frac{4x + 3y}{x - y}.$$

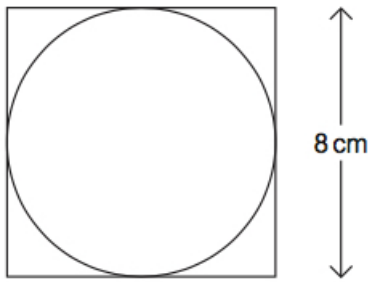
Work out the value of A when $x = 6$ and $y = -1$.

6. Circle the **two** equations that are equivalent to (2)

$$2y = 3x + 4.$$

A $2x = 3y + 4$
B $y - \frac{3}{2} = 2$
C $y = \frac{3}{2} + 4$
D $3x - 2y + 4 = 0$

7. The diagram shows a circle inside a square. (3)



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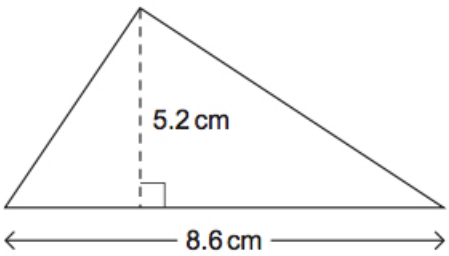
Work out the area of the circle.

8. Work out the area of the triangle. (3)



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Give your answer to 1 decimal place.

9. Show that the equation (2)

$$x^3 + 8x = 30$$

has a solution between $x = 2.2$ and $x = 2.3$.

10. (a) A drink is made from 1.5 litres of orange juice and 7.5 litres of lemonade. (3)

What fraction of the drink is orange juice?
Give your answer in its simplest form.

(b) A different drink is made from 2 litres of blackcurrant juice and 12 litres of water. (3)

How much more blackcurrant juice should be added so that 25% of the drink is blackcurrant juice?

11. Mark went fishing on four Saturdays.

	Week 1	Week 2	Week 3	Week 4
Number of fish caught	4	1	6	3
Time fishing	2.5 hours	1.5 hours	5 hours	2.5 hours
Mean weight of fish caught	1.2 kg	2.3 kg	0.8 kg	1.9 kg

(a) Work out the **mean** number of fish caught **per hour** in **Week 1**. (2)

(b) Mark says, "One of the fish I caught weighed 5 kg." (2)

In which week did this happen?
Give a reason for your answer.

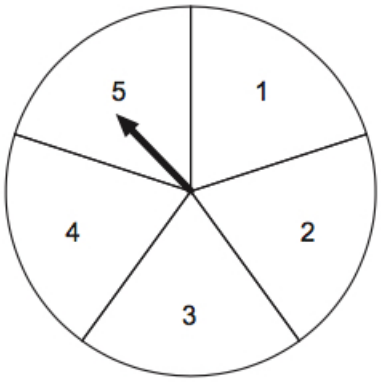
12. (a) Expand and simplify (2)

$$(x + 6)^2.$$

(b) Expand and simplify (4)

$$9w(3x - 4y) - 5w(x + y).$$

13. Matt made this spinner.
He spins the arrow 200 times.



(a) How many times would you expect the arrow to stop on the number 5 if the spinner is fair? (2)

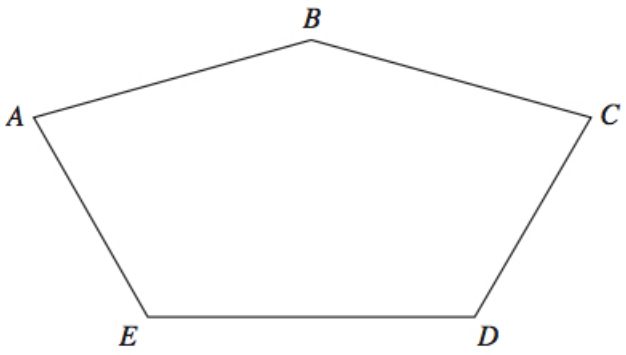
(b) The table shows the number of times the arrow stops on each number. (2)

Stops On	1	2	3	4	5
Number of times	32	41	65	27	35

Do you think the spinner is fair?
Give a reason for your answer.

14. This pentagon has a vertical line of symmetry. (5)
The ratio of angles

$$B : C : D = 6 : 3 : 4.$$



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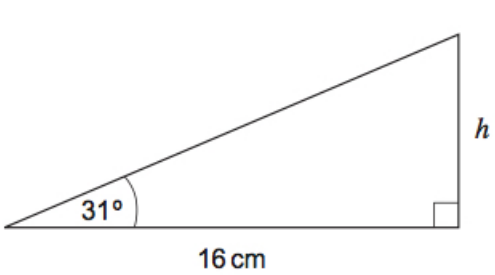
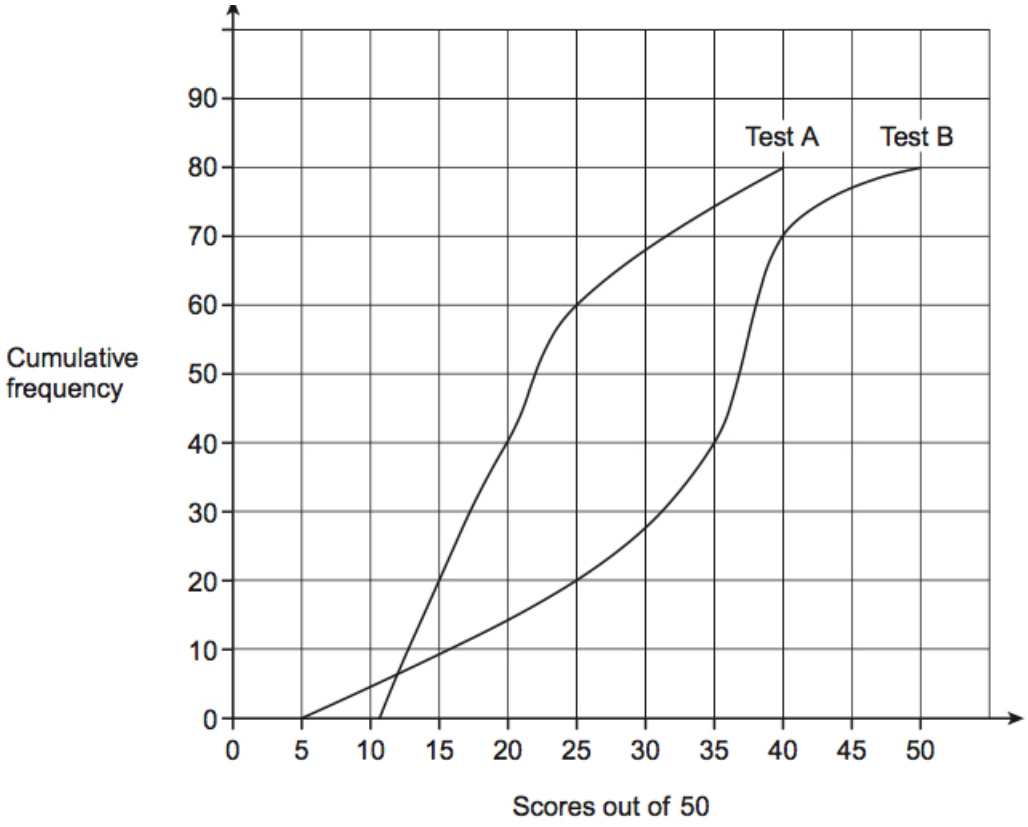
Work out the size of angle B.

15. Work out the height h. (3)



16. The same students take two tests.
The scores out of 50 are represented on the cumulative frequency graphs.



(a) How many students took each test? (1)

(b) Work out the median score for each test. (2)

The interquartile range for test B is 13.

(c) Work out the interquartile range for test A. (2)

(d) Which test is more difficult? (1)
Give one reason to support your answer.

17. These expressions represent three numbers. (3)

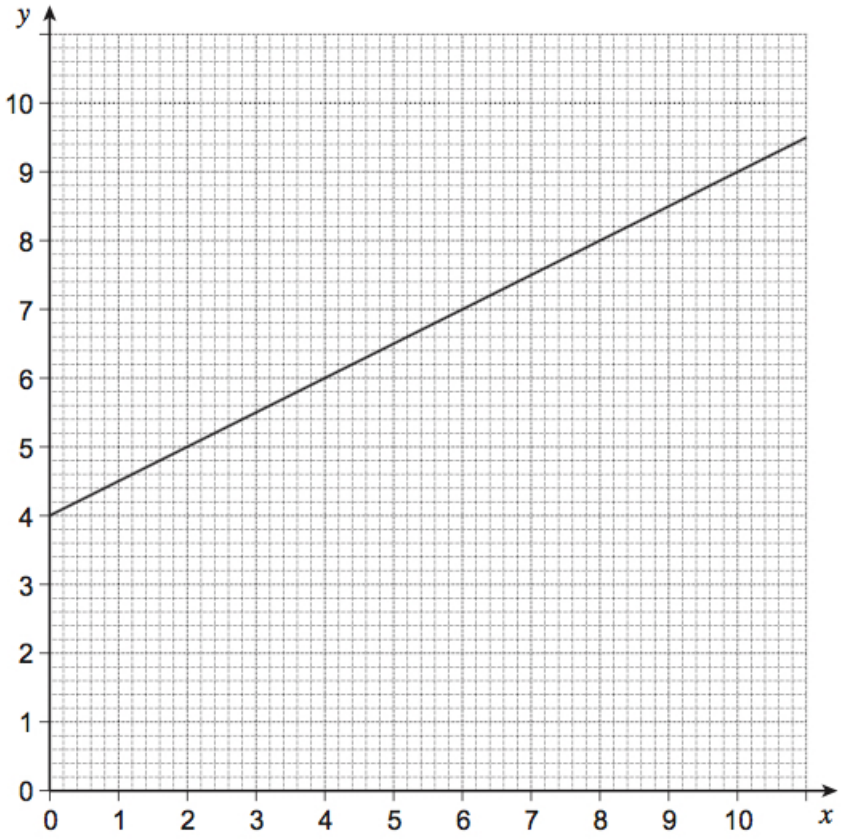
$$x \qquad x+3 \qquad 4x$$

Work out the mean in terms of x.
Give your answer in its simplest form.

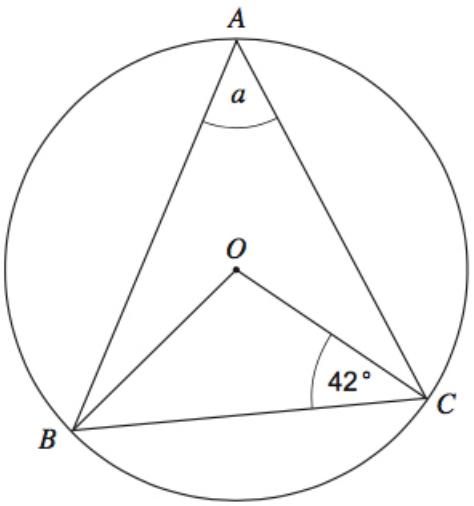
18. Solve (4)

$$\frac{18+5x}{3} = 10 - x.$$

19. Work out the equation of the line shown. (3)



20. The diagram shows a circle, centre O. (3)



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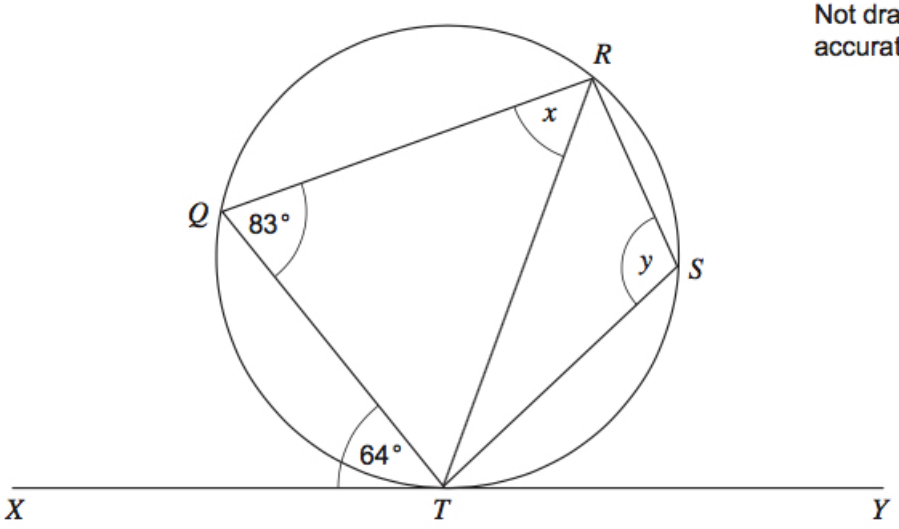
Work out the value of a.

21. XTY is a tangent to the circle.



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(a) Write down the value of x. (2)
Give a reason for your answer.

(b) Work out the value of y. (1)

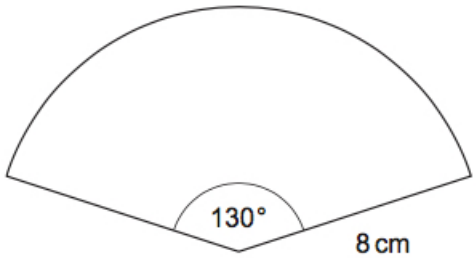
22. The table shows the probabilities that I am on time or late for work each day. (5)

It also shows the amount of pay deducted for being late each day.

	On Time	Up to 30 minutes late	30 minutes to 1 hour late
Probability	0.6	0.3	0.1
Amount Deducted	—	£8	£16

Work out the probability that I have exactly £16 deducted **over two days**.

23. The diagram shows a sector of a circle. (4)



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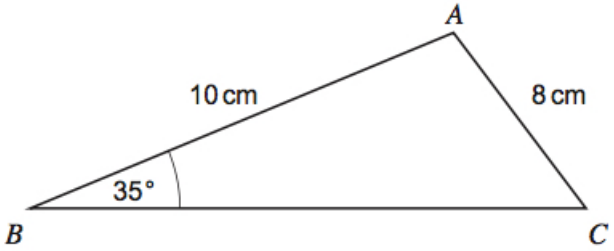
Work out the area of the sector.
Give your answer to a suitable degree of accuracy.

24. In the diagram, angle A is obtuse. (4)



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Work out the size of angle A.

25. n is a positive integer. (4)

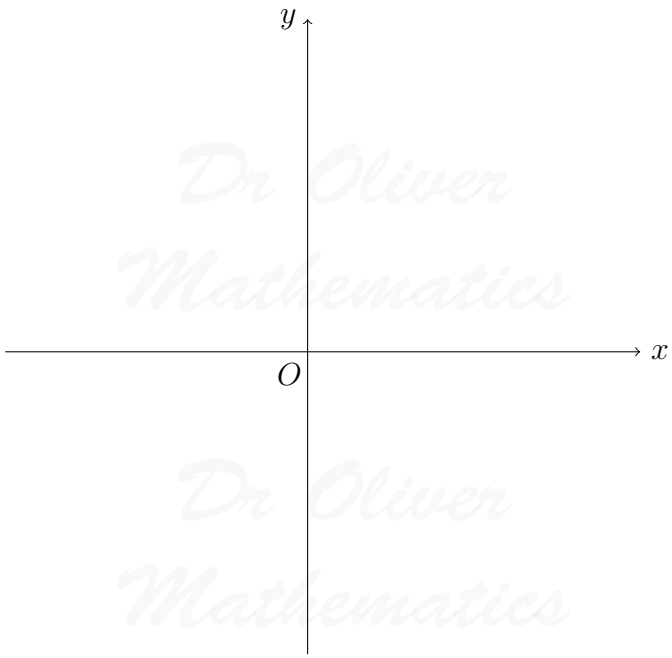
Prove that

$$n^2 + 3n + 2$$

must be a multiple of 2.

26. (a) On the axes, make a sketch of (1)

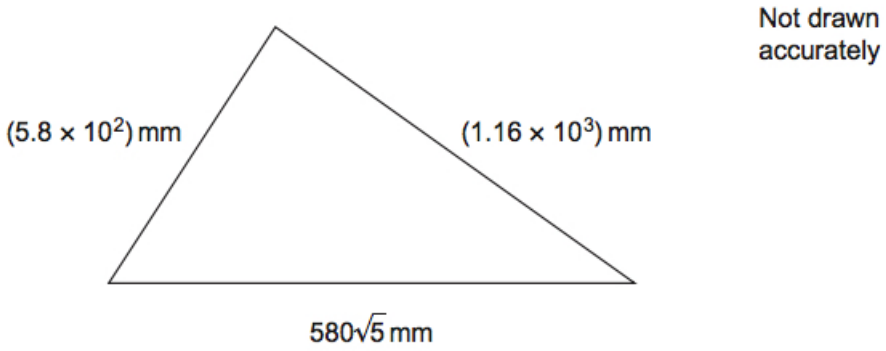
$$y = x^3.$$



(b) On the axes, make a sketch of (1)

$$y = \frac{1}{x}.$$

27. Is this a right-angled triangle? (4)



You **must** justify your answer.

28. Solve the simultaneous equations (5)

$$y = 10 - xy \qquad = 2x^2 + 4.$$