Name:

GCSE Maths 2022
Edexcel Higher Paper 2
Set A
Calculator

Corbettmaths

Equipment

1. A black ink ball-point pen.
2. A pencil.
3. An eraser.
4. A ruler.
5. A pair of compasses.
6. A protractor.

Guidance

1. Read each question carefully.
2. Check your answers seem right.
3. Always show your workings

Information

1. This paper has been created based on topics in the Advance Information.
2. Also see Corbettmaths for the checklist for the entire GCSE as these topics may still be useful for Paper 2
3. There is one question per topic - this paper is designed to give an opportunity to practice each topic rather than replicate the actual paper.
4. The marks for questions are shown in brackets

GCSE 2022 Resources

1. Use your calculator to work out

$$\frac{\sqrt{39.75 + 24.44}}{0.55 \times \sqrt[3]{1.2 \times 1.9}}$$

(a) Write down all the figures on your calculator display

11.06775107

(2)

(b) Write your answer to (a) correct to 2 significant figures

11

(1)

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2. Kevin is going on holiday to Japan.
He wants to change some money into yen.

The bank only stocks ¥1000 notes.
James wants to change up to £300 into yen.
He wants as many ¥1000 notes as possible.

The exchange rate is £1 = ¥168

How many ¥1000 notes should he get?

300 × 168 = 50400

50000

50

(3)

3. Simplify

$(2m^4)^3$

$8m^{12}$

.....

(2)

4. The population of a country at the beginning of 2011 was 4,380,000
Over the next decade, the population increased by 7%

Work out the population at the beginning of 2021

4380000×1.07

4686600

.....

(2)

5. Martyn has some money to invest and sees this advert.

Bank of Maths

Double your money in 15 years.

The average annual growth for your investment is 4.5%

Will Martyn double his money in 15 years by investing his money with "Bank of Maths?"

You **must** show your workings.

$100 \times 1.045^{15} = 193.528...$

No, it will increase by 93.53%

(3)

6. Bag A contains 5x coins. $5x+8$
Bag B contains 3x coins. $3x-8$
8 coins are taken from Bag B and put into Bag A
The ratio of coins in Bag A to Bag B is now 11:5

Work out the total number of coins.

$5x+8 : 3x-8 = 11:5$

$5(5x+8) = 11(3x-8)$

$25x+40 = 33x-88$

$128 = 8x$ $\quad 8\times16$

$x = 16$

128

.....

(3)

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7. The time taken, t, for passengers to be checked-in for a flight is inversely proportional to the square of the number of staff, s, working.

It takes 30 minutes passengers to be checked-in when 10 staff are working.

(a) Find an equation connecting t and s.

$t \propto \frac{1}{s^2}$ $\quad t = \frac{3000}{s^2}$

$t = \frac{k}{s^2}$

$30 = \frac{k}{10^2}$ $\quad k = 3000$

$t = \frac{3000}{s^2}$

.....

(3)

(b) What is the minimum number of staff that must be working so that the time taken is under 60 minutes?

$60 = \frac{3000}{s^2}$

$60s^2 = 3000$

$s^2 = 50$

$s = 7.071...$

8

.....

(3)

8. q is inversely proportional to the square of t.
When q = 7.5, t = 1.6

(a) Calculate the value of q when t = 8

$q \propto \frac{1}{t^2}$

$q = \frac{k}{t^2}$

$7.5 = \frac{k}{1.6^2}$

$k = 19.2$

$q = \frac{19.2}{t^2}$

$q = \frac{19.2}{8^2}$

0.3

(3)

(b) Calculate the value of t when q = 1.875

$1.875 = \frac{19.2}{t^2}$

$t^2 = \frac{256}{25}$

3.2

(2)

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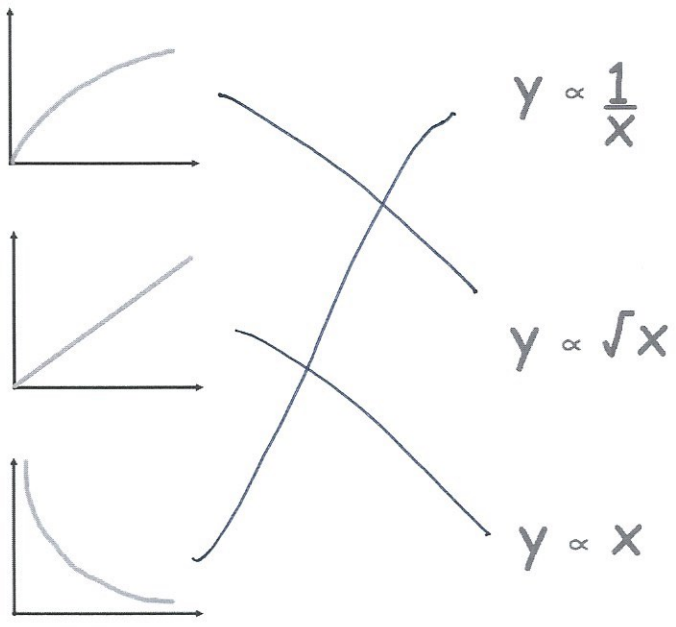
9. Match each graph to the correct relationship.



(3)

10. Miss Jones owns a factory that makes pens.
She has received an order for a large quantity of pens and she knows if she used 8 machines, it would take 72 hours for enough pens to be made.

Miss Jones plans to start making pens at 8am on Monday with 2 machines.
She can start using a third machine at 5pm on Tuesday.
Finally 3 more machines will be free at 10am on Wednesday.

Approximately when will enough pens be made?

$72 \times 8 = 576$ hours

$2 \times 33 = 66$

$576 - 66 = 510$ hours

$3 \times 17 = 51$

$510 - 51 = 459$ hours

$459 \div 6 = 76.5$ hours

8am Monday
↓ 33 hours
5pm Tuesday
↓ 17 hours
10am Wed
↓ + 72 hours
10am Sat.
↓ + 4.5 hours
14:30 Sat

14:30 on Sat

(4)

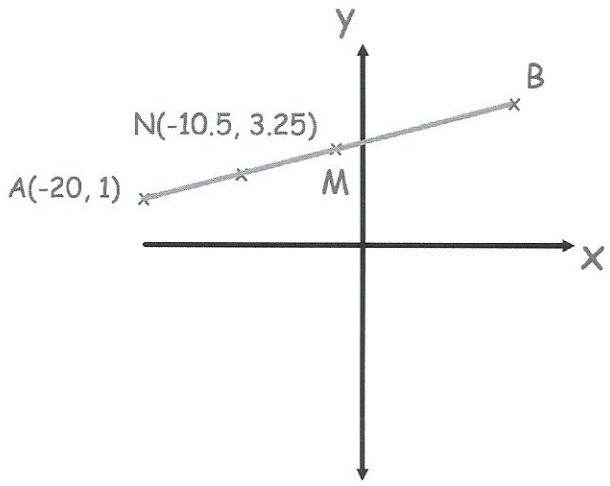
11. Nigel measures the time, t seconds, to complete a race as 14.8 seconds correct to the nearest tenth of a second.

Write down the error interval for t.

$14.75 \leq t \leq 14.85$

(2)

12.



M is the midpoint of AB.
N is the midpoint of AM.

Find the coordinates of the point B.

$M(-1, 5.5)$

$B(18, 10)$

(18, 10)

(4)

13. Expand and simplify $5(3y + 7) - 3(2y - 5)$

$15y + 35 - 6y + 15$

$9y + 50$

$9y + 50$

(2)

14. Expand and simplify $(1-2x)(x+3)(x-1)$

$(x+3-2x^2-6x)(x-1)$

$(3-5x-2x^2)(x-1)$

$3x-5x^2-2x^3-3+5x+2x^2$

$8x-3x^2-2x^3-3$

$-2x^3-3x^2+8x-3$

(3)

15. Factorise fully

$9m^2-12mp$

$3m(3m-4p)$

$3m(3m-4p)$

(2)

16. Factorise

(a) $3x^2+13x+4$

$(3x+1)(x+4)$

(2)

(b) $5x^2 - 13x - 6$

$(5x + 2)(x - 3)$

(2)

17. Harley is 8 years younger than India. Jessica is three times older than Harley. The sum of the three ages is 88.

Write the ratio of Jessica's age to India's age.

x, $x+8$, $3x$, 48, 24

$5x + 8 = 88$

$5x = 80$

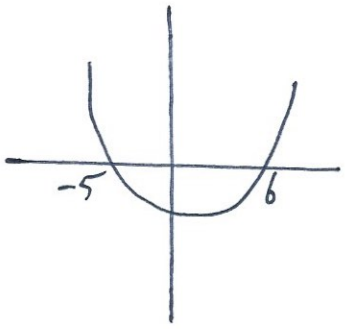
$x = 16$

2 : 1

(4)

18. Solve the inequality $x^2 - x - 30 \geq 0$

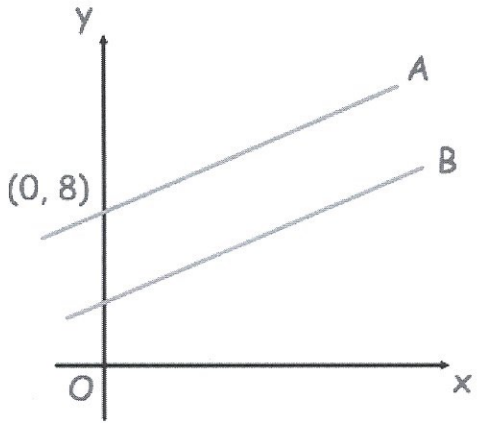
$(x - 6)(x + 5)$



$x \leq -5$ or $x \geq 6$

(3)

19.



The lines A and B are parallel.

The line A passes through the point (0, 8)
The line B has equation y = 3x + 1

Write down the equation of line A

$y = 3x + 8$

(2)

20. The function f is such that $f(x) = kx + 3$

The function g is such that $g(x) = 2x - 4$

Given that $gf(2) = 34$

work out the value of k

$f(2) = 2k + 3$

$g(2k+3) = 2(2k+3) - 4$

$4k + 2 = 34$

$4k = 32$

$k = 8$

8

(3)

21. $f(x) = \frac{3x}{5} + 1$

(a) Find $ff(2)$

$f(2) = \frac{6}{5} + 1$

$= 2.2$

$f(2.2) = \frac{6.6}{5} + 1$

2.32

(2)

(b) Find $f^{-1}(350)$

$y = \frac{3x}{5} + 1$

$y - 1 = \frac{3x}{5}$

$5y - 5 = 3x$

$x = \frac{5y - 5}{3}$

$f^{-1}(x) = \frac{5x - 5}{3}$

$f^{-1}(350) = 581.6$

581.666...

(3)

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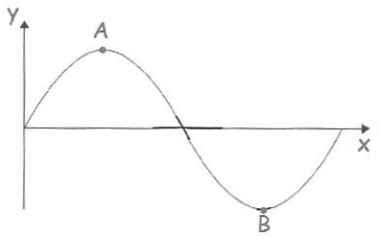
22. Shown is part of the curve y = sin x



(a) Write down the coordinates of the point A.

(90 , 1)

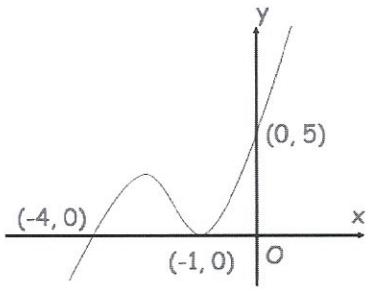
(1)

(b) Write down the coordinates of the point B.

(270 , -1)

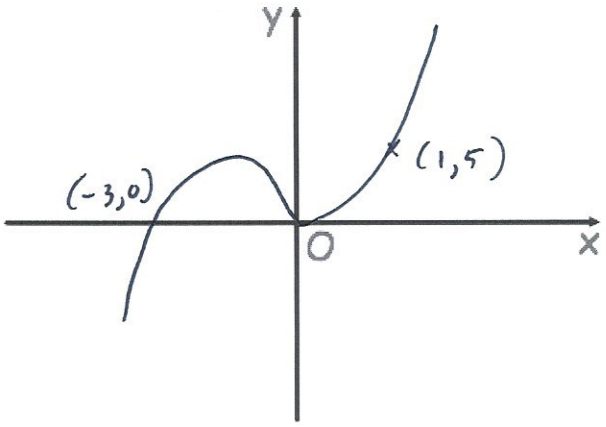
(1)

23. Shown below is the curve with equation y = f(x).
The curve passes through the points (-4, 0), (-1, 0) and (0, 5)



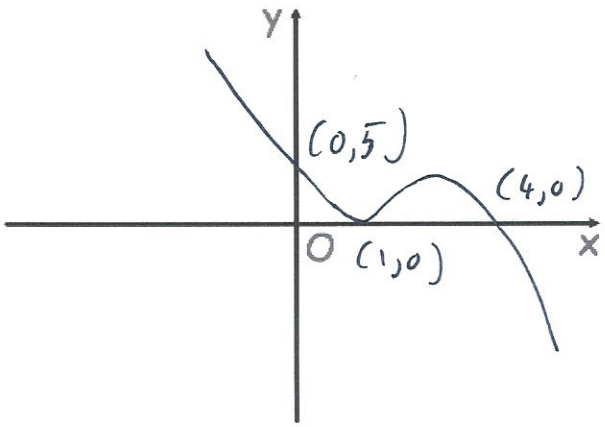
Sketch the curve with equation:

(a) y = f(x – 1)



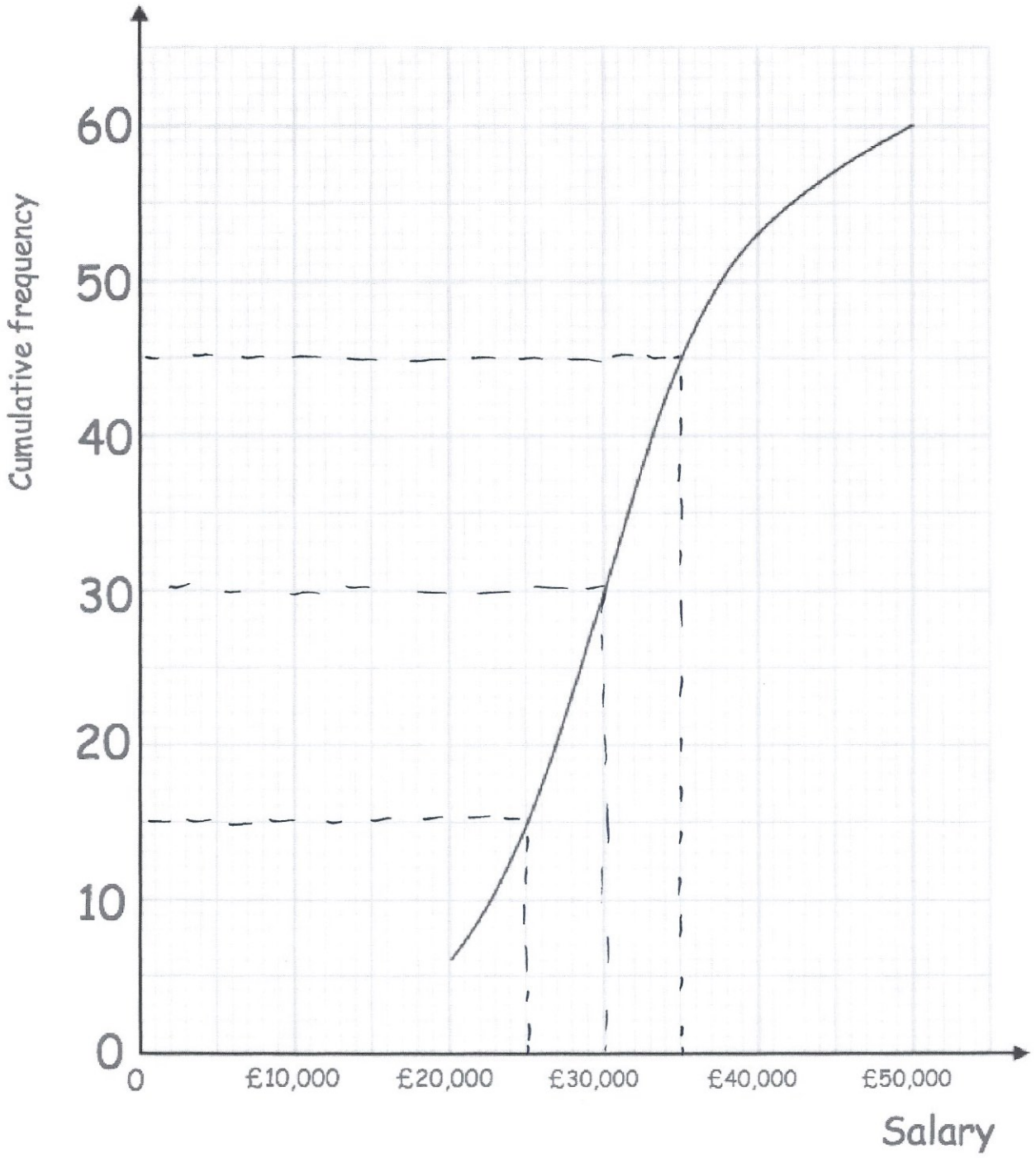
(2)

(b) y = f(–x)



(2)

24. A university surveyed 60 mathematics graduates on their starting salary.
The cumulative frequency graph shows some information about the salaries.



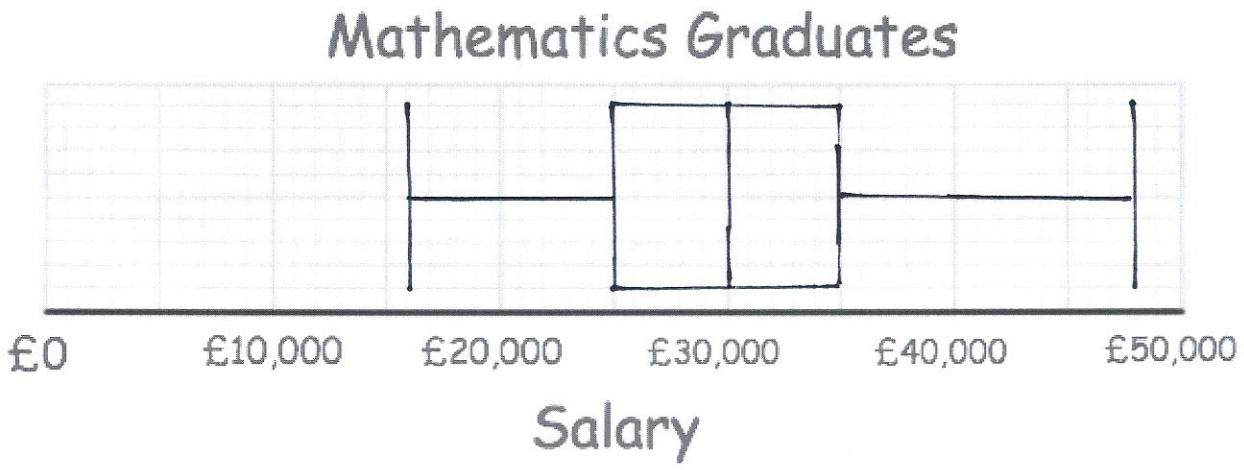
(a) Use the graph to find an estimate for the median salary.

£ 30000

(1)

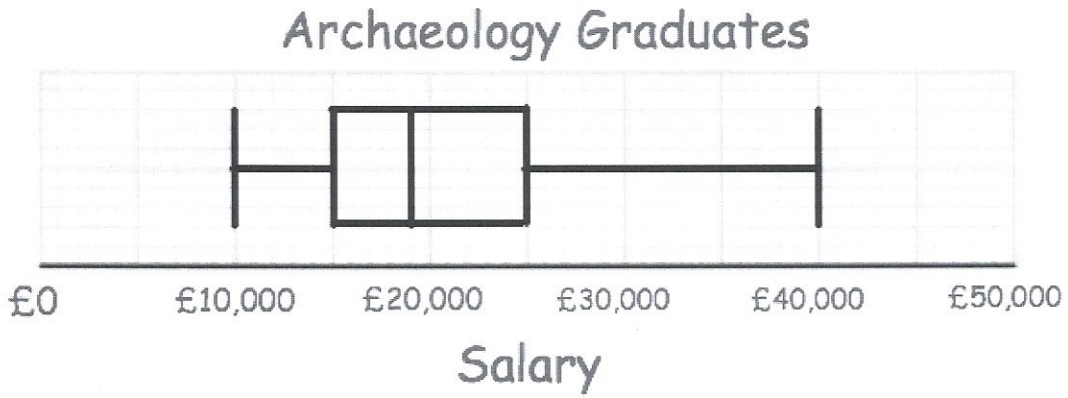
The 60 mathematics graduates
had a minimum salary of £16,000
and a maximum salary of £48,000.

(b) Use this information and the cumulative frequency curve to draw a box plot for the 60 mathematics graduates.



(3)

The university also surveyed 60 archaeology graduates.
The box plot below shows information about their salaries.



(c) Compare the distribution of the salaries of the mathematics graduates with the distribution of the salaries of the archaeology graduates.

The salaries have a similar spread as both have an IQR of £10000. The mathematics graduates clearly earn more, with a median of £30000, compared to £19000.

(2)

25. Here are the hourly rates of pay for 7 workers

£8.50 £9.25 £8.70 £14.10 £9.50 £10.75 £8.80

(a) Find the lower quartile

£8.50 £8.70 £8.80 £9.25 £9.50 £10.75 £14.10

£8.70

.....

(2)

(b) Find the upper quartile

£10.75

.....

(2)

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26. There are red, green, pink and white counters in a box.

There are an equal number of red and white counters.
There are ten times more green than white counters.
There are twice as many red than pink counters.

Jim takes a counter at random from the box.

Work out the probability than Jim takes a green counter.

red = x
white = x
green = $10x$
pink = $\frac{1}{2}x$

$\frac{10x}{12.5x} = \frac{10}{12.5} = \frac{20}{25}$

$\frac{4}{5}$

.....

(4)

27. There are 8 sweets in a bag.
Three sweets are red, three sweets are blue and two sweets are green.

Three sweets are selected at random **without** replacement.

Calculate the probability that the sweets are **not** all the same colour.

Same

$P(RRR) = \frac{3}{8} \times \frac{2}{7} \times \frac{1}{6} = \frac{1}{56}$

$P(BBB) = \frac{3}{8} \times \frac{2}{7} \times \frac{1}{6} = \frac{1}{56}$

$\frac{1}{28}$

$\frac{27}{28}$

.....

(4)

28. A group of scientists want to estimate the number of squirrels in a wood.
They catch and ring 20 squirrels.
They return the 20 squirrels to the wood.
They then catch 50 squirrels and 13 are ringed.

Estimate the number of squirrels in the wood.

$\frac{20}{N} \times \frac{13}{50}$

$13N = 1000$

$N = 76.923...$

77 (or 76)

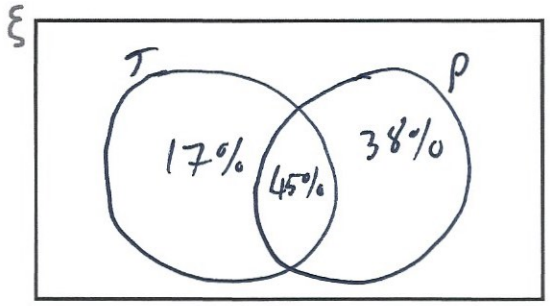
.....

(2)

29. A PE test has two sections, theory and practical.

Everyone in a class who took the PE test passed at least one section.
62% passes the theory section and 83% passed the practical section.

(a) Represent this information on a Venn diagram



(3)

A student is selected at random.

Work out the probability that this person

(a) passed the theory section, given they passed the practical section.

$\frac{45}{83}$

.....

(2)

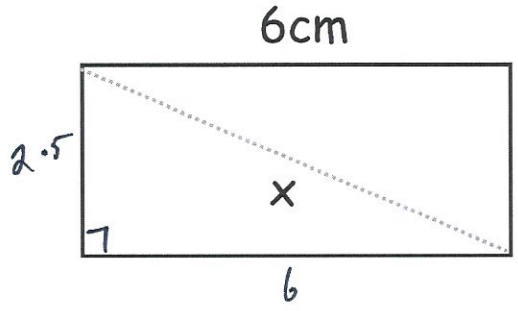
(b) passed the practical section, given they passed only one section.

$\frac{38}{55}$

.....

(2)

30.



The rectangle has an area of 15cm²

$15 \div 6 = 2.5$

Find x

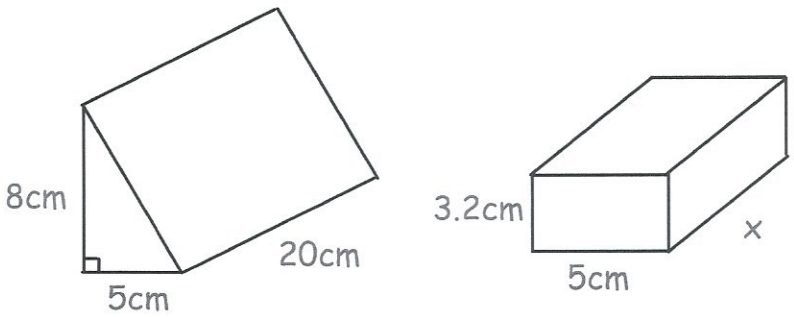
$2.5^2 + 6^2 = 42.25$

$\sqrt{42.25} = 6.5$

6.5cm

(3)

31. The cuboid and the triangular prism have the same volume.



Find x.

$\frac{1}{2} \times 5 \times 8 \times 20$

$= 400 cm^3$

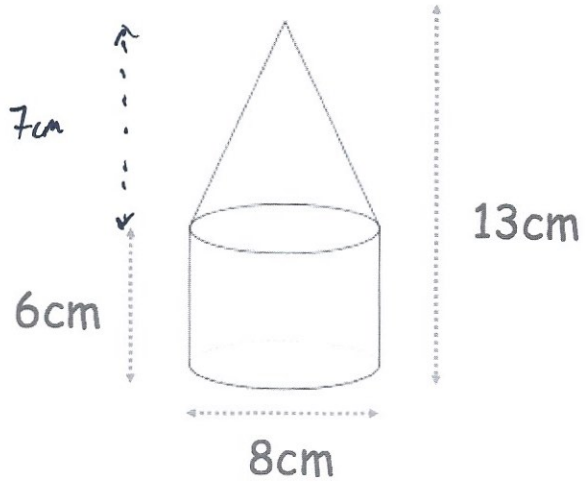
$400 \div 16 = 25$

$3.2 \times 5 = 16$

25cm

(3)

32. A solid is formed from a cylinder and a cone.
Find the volume of the solid.



$\pi \times 4^2 \times 6 = 301.592\ldots \text{cm}^3 \ (96\pi)$

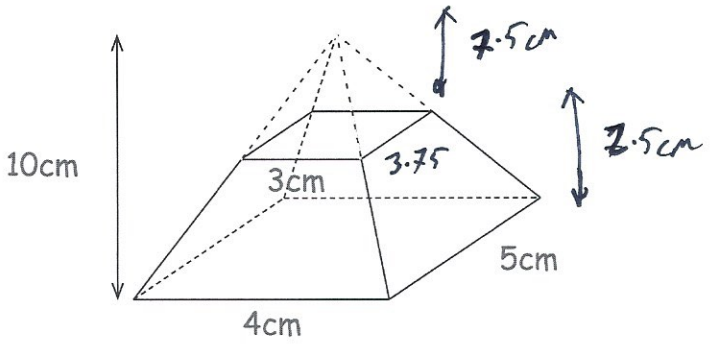
$\frac{1}{3} \times \pi \times 4^2 \times 7 = 117.286\ldots \text{cm}^3 \ \left(\frac{112}{3}\pi\right)$

418.88 .....cm³

(3)

33. A solid pyramid, of height 10cm, is divided into two parts by removing a smaller pyramid from the top.

The remaining frustum is shown below.



Work out the volume of the frustum

$\frac{1}{3} \times 4 \times 5 \times 10 = \frac{200}{3}$ cm^3

$\frac{1}{3} \times 3 \times 3.75 \times 7.5 = \frac{225}{8}$ cm^3

38.541$\dot{6}$ cm^3

(5)

34. Convert 750cm² to m²

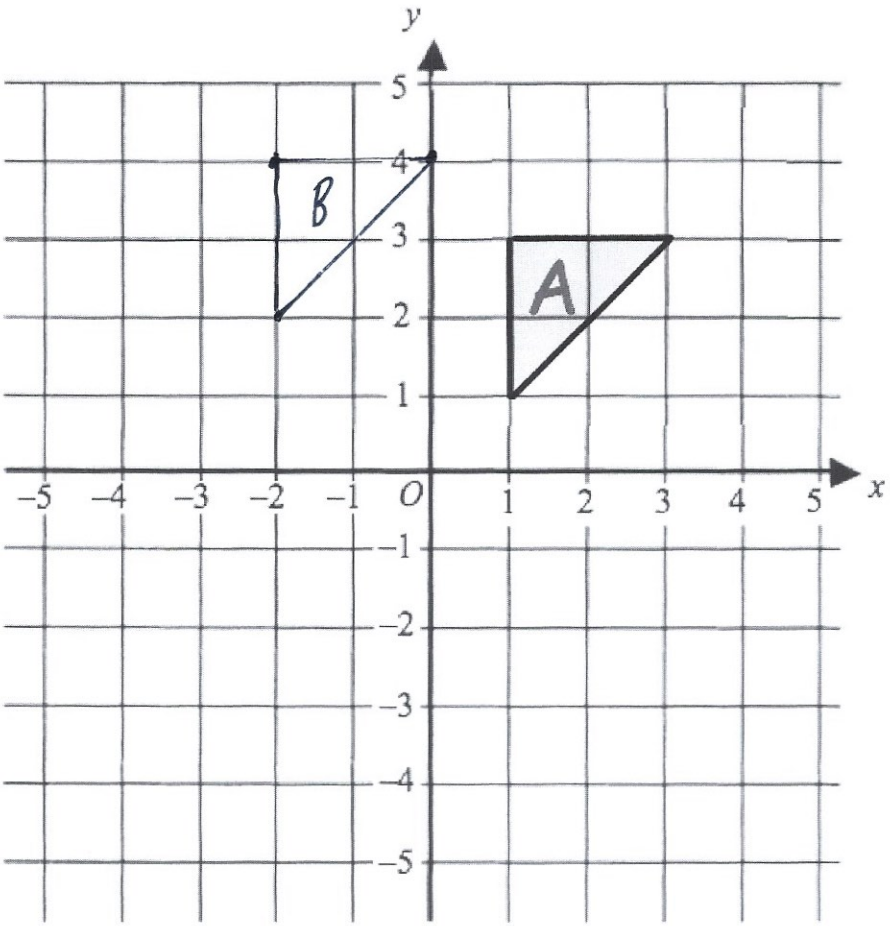
$750 \div 100 = 7.5$

$7.5 \div 100 = 0.075$

0.075 m²

(2)

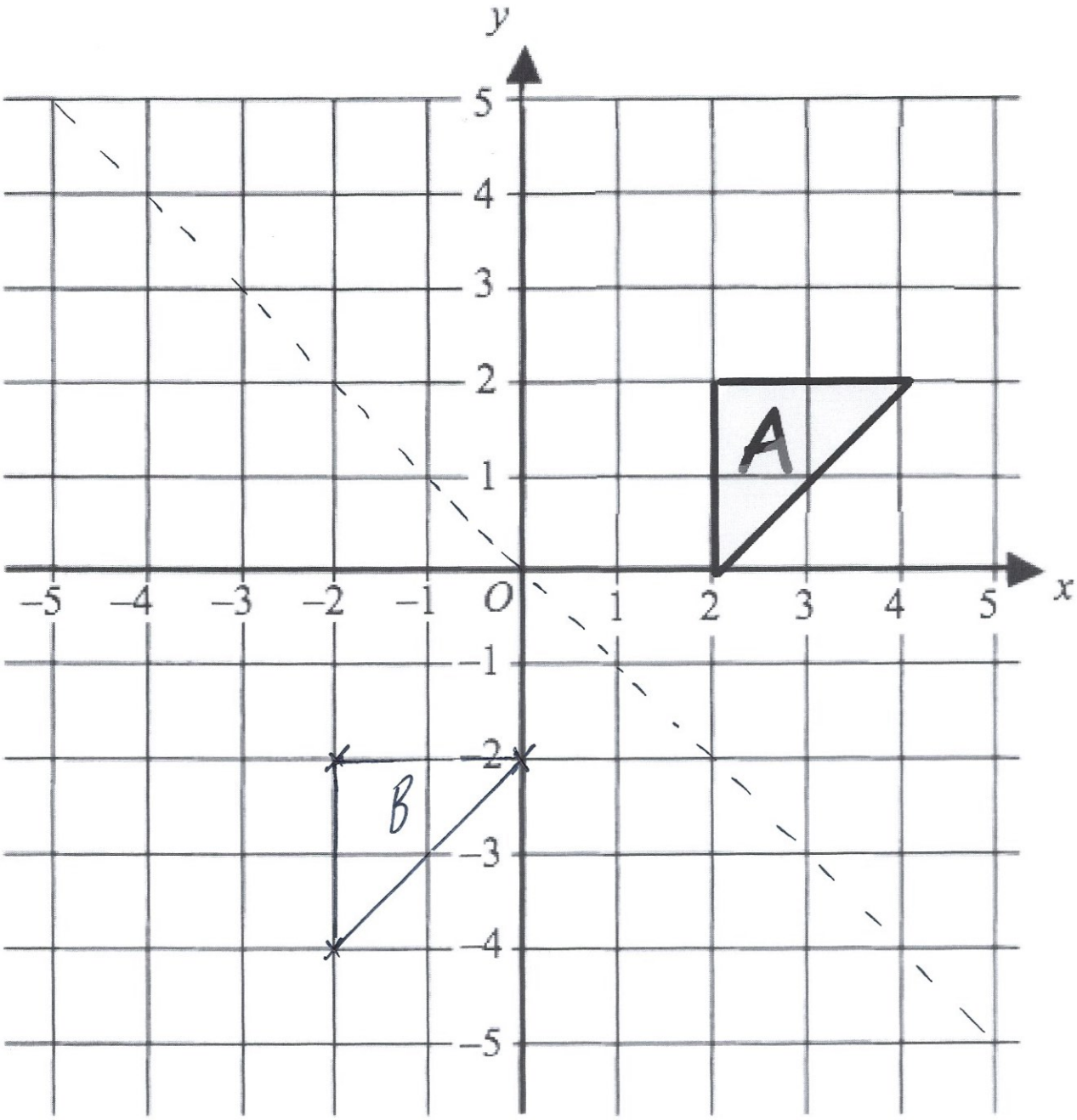
35.



Translate triangle A by the vector $\begin{pmatrix} -3 \\ 1 \end{pmatrix}$

(2)

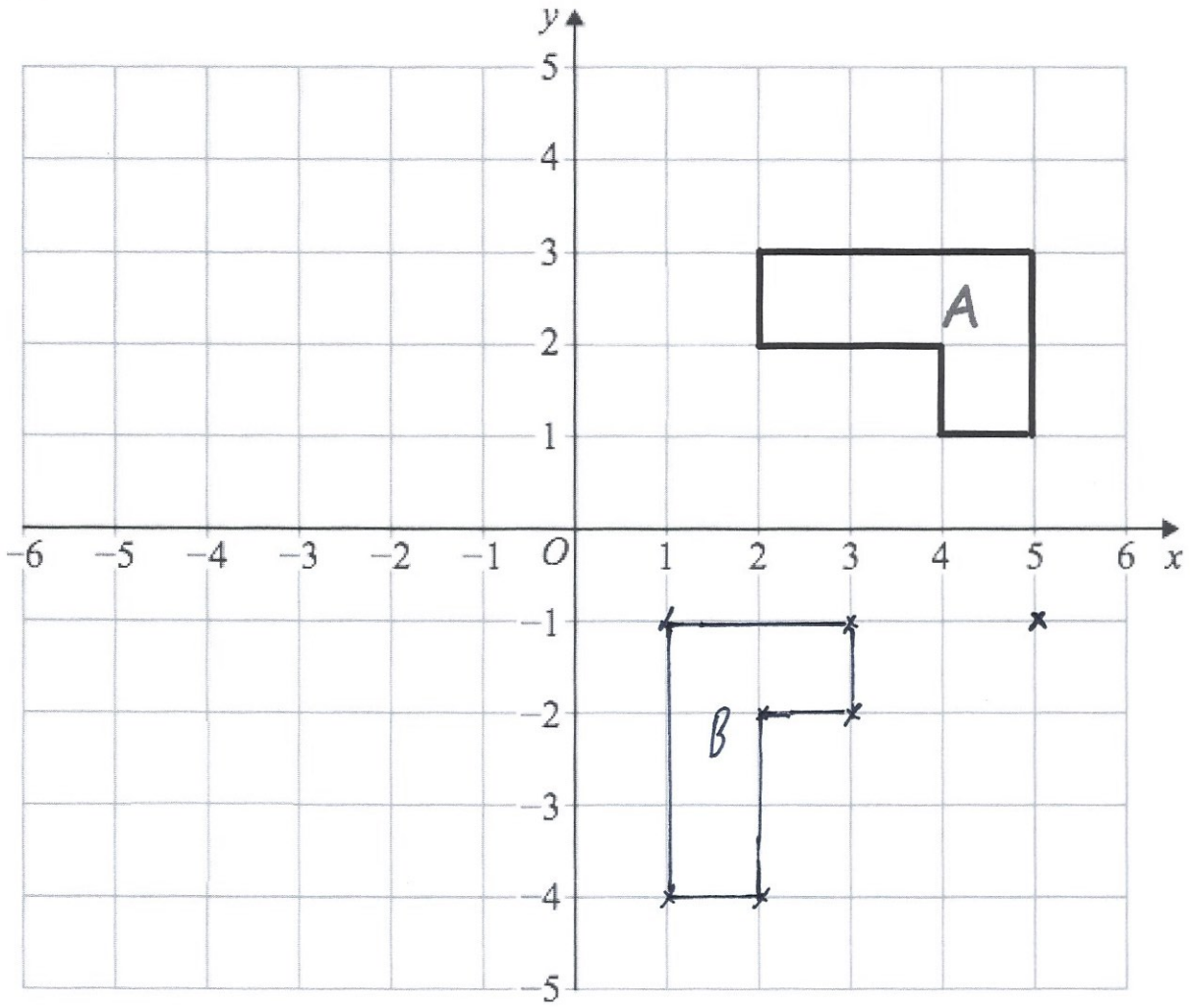
36.



Reflect the triangle in the line y = –x
Label the new triangle B.

(2)

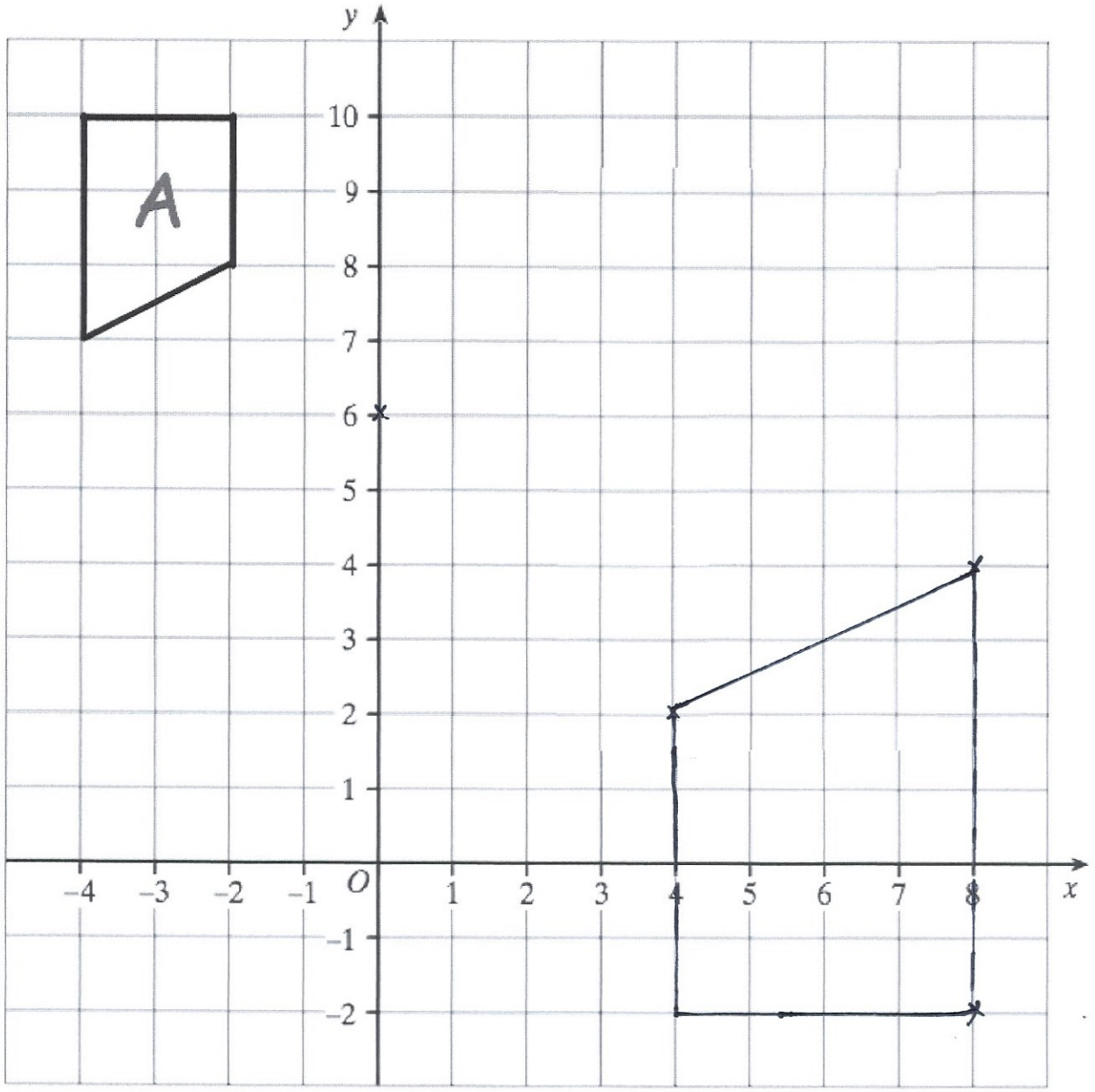
37.



Rotate shape A 90° anti-clockwise about centre (5, –1)

(3)

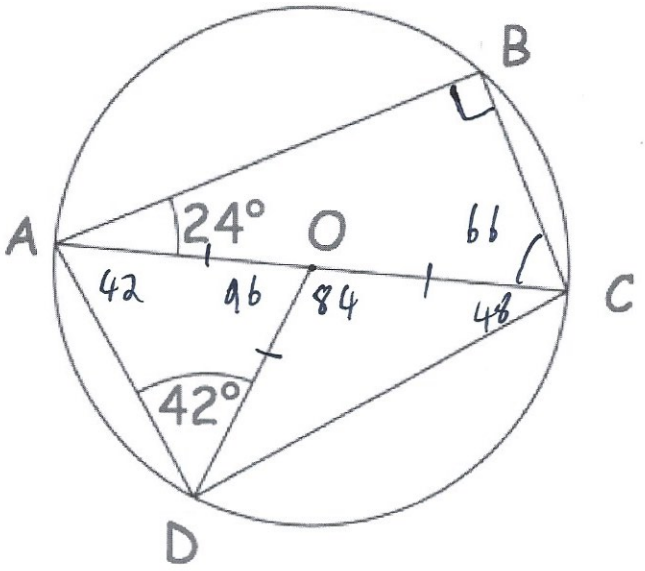
38.



Enlarge the triangle by scale factor –2, using centre of enlargement (0, 6)

(3)

39.



In the diagram O is the centre of the circle.
AOC is a straight line.
Angle BAO is 24° and Angle ADO is 42°

(a) Find the size of angle CAD.

42 .....°

(1)

(b) Find the size of angle ACB.

180 − 90 − 24

66 .....°

(1)

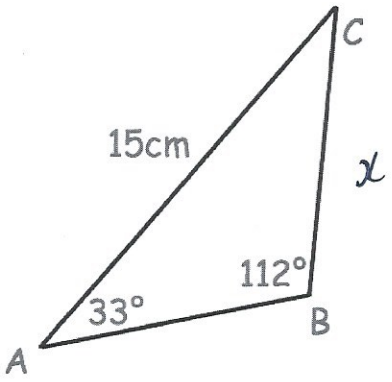
(c) Find the size of angle BCD.

66 + 48 = 114

114 .....°

(1)

40.



In triangle ABC the length of AC is 15cm.
Angle ABC = 112°
Angle BAC = 33°

Work out the length of BC.

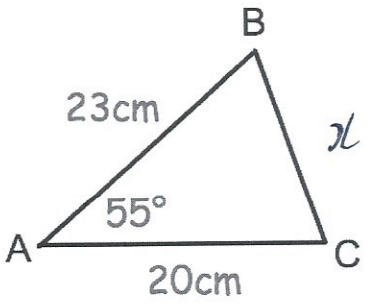
$\frac{x}{\sin 33} = \frac{15}{\sin 112}$

$x = 8.811$

8.811 .....cm

(3)

41.



Calculate the length of BC.

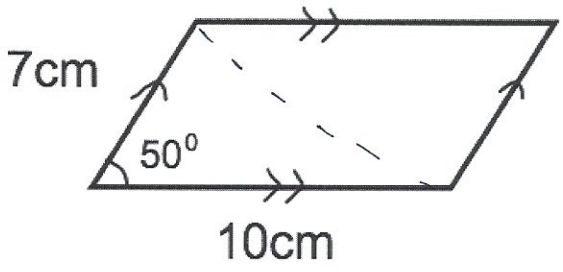
$x^2 = 23^2 + 20^2 - 2 \times 20 \times 23 \times \cos 55$

$x^2 = 401.3096...$

20.033 .....cm

(3)

42. Shown below is a parallelogram.



Calculate the area of the parallelogram.

$\frac{1}{2} \times 7 \times 10 \times \sin 50 = 26.811...$

$26.811... \times 2 = 53.623...$

53.623 .....cm²

(5)

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43. Find the pressure exerted by a force of 240 newtons on an area of 30cm²

Give your answer in newtons/m²

$0.003 m^2$

$P \quad \frac{F}{A}$

$\frac{240}{0.003} = 80000 N/m^2$

80000 N/m² .....

(3)