Name:

GCSE Maths Practice Paper
CCEA Unit M4
Set A
Calculator Paper

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.
7. A calculator

Guidance

1. Read each question carefully.
2. Don't spend too long on one question.
3. Attempt every question.
4. Check your answers seem right.
5. Always show your workings

Information

1. Time: 2 hours
2. The maximum mark for this paper is 100.
3. The marks for questions are shown in brackets
4. You may use tracing paper.

Question	Mark	Available
1		6
2		2
3		4
4		5
5		5
6		6
7		6
8		5
9		2
10		3
11		4
12		6
13		3
14		2
15		3
16		3
17		7
18		5
19		4
20		6
21		5
22		8
23		0
24		0
25		0
Total		100

1. Nathan delivers pizzas in Dungannon.

The table below shows information about his delivery times.

Delivery Time	Frequency
$0 < t \leq 10$	3
$10 < t \leq 20$	10
$20 < t \leq 30$	14
$30 < t \leq 40$	19
$40 < t \leq 50$	4
	50

x	fx
5	15
15	150
25	350
35	665
45	180
	1360

(a) Calculate an estimate for the mean delivery time

$1360 \div 50$

27.2 minutes

(4)

If Nathan takes longer than 40 minutes to deliver the pizza, the customer receives a free garlic bread.

(b) What percentage of his deliveries receive a free garlic bread?

$\frac{4}{50}$

8 %

(2)

2. Expand and simplify $6(3x + 2) - 2(5x - 7)$

$18x + 12 - 10x + 14$

$8x + 26$

(2)

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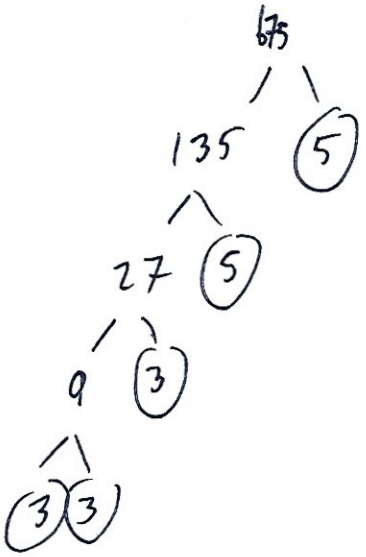
3. (a) Write 675 as a product of prime factors.
Express your answer in index form.



$675 = 3 \times 3 \times 3 \times 5 \times 5$

$= 3^3 \times 5^2$

$3^3 \times 5^2$

(3)

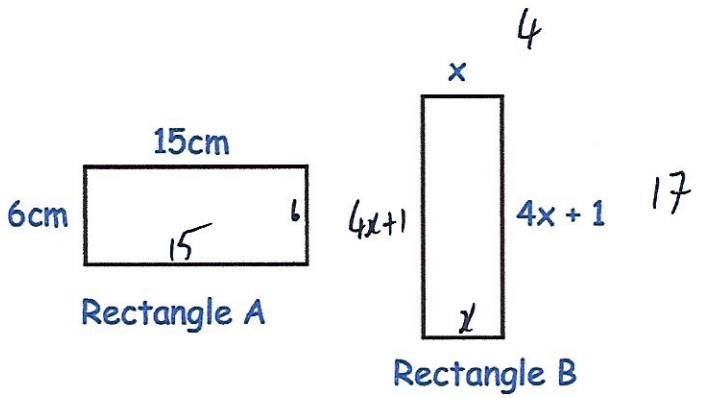
(b) Hence find the **least** number by which 675 would need to be multiplied by to give a cube number.

$3, 5 \times 3, 5 \times 3,$

5

(1)

4.



Both rectangles have the same perimeter.

Find the area of rectangle B.

$6 + 15 + 6 + 15 = 42\text{ cm}$

$10x + 2 = 42$

$10x = 40$

$x = 4$

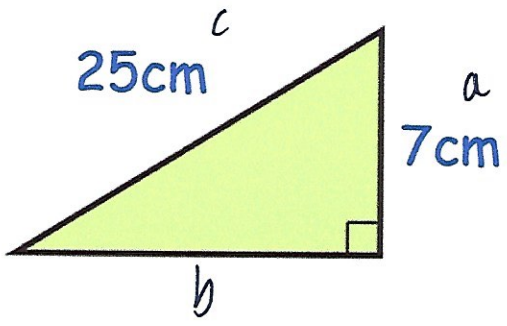
4×17

68

.....cm²

(5)

5. Here is a right angle triangle.



Calculate the area of the triangle.

$7^2 + b^2 = 25^2$

$49 + b^2 = 625$

$b^2 = 576$

$b = 24$

Area $= \frac{1}{2} b h$

$= \frac{1}{2} \times 24 \times 7$

...84.....cm²

(5)

6. (a) The value of a painting rises from £120,000 to £192,000.

Work out the percentage increase in the value of the painting.

$\frac{72000}{120000} \times 100$

60 ..... %

(2)

(b) Parker bought a house.
In the first year the value of the house decreased by 10%.
In the second year the value of the house increased by 10%.

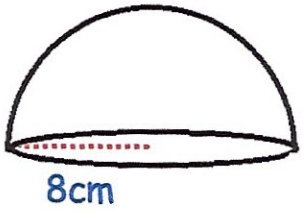
Is the house worth more, less, or the same as what Parker paid for it?
Show your working out.

$100 \times 0.9 \times 1.1 = 99$

1% less .....

(4)

7. Shown below is a solid hemisphere with a radius of 8cm.



(a) Find the volume of the hemisphere

volume of a sphere $= \frac{4}{3}\pi r^3$

$= \frac{4}{3} \times \pi \times 8^3$

$= 2144.660585$

$2144.660585 \div 2$

1072.33 ..... cm^3

(3)

(b) Find the surface area of the hemisphere

SA of Sphere $= 4\pi r^2$

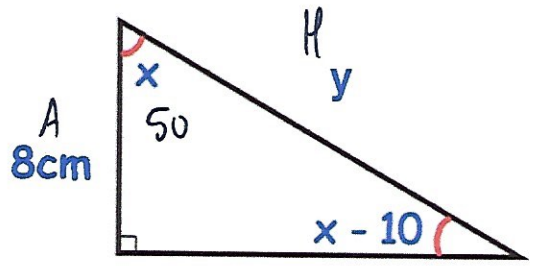
$\therefore$ SA of hemisphere $= 2\pi r^2 + \pi r^2$ (base)

$= 2\pi \times 8^2 + \pi \times 8^2$

603.186 ..... cm^2

(3)

8. Here is a right angled triangle.



Work out the length of the side labelled y.

$x + (x - 10) + 90 = 180$

$2x + 80 = 180$

$2x = 100$

$x = 50$

C A H

$\cos 50° = \frac{8}{y}$

$y = \frac{8}{\cos 50°}$

12.45 cm

(5)

9. Solve the equation $y^2 + y - 42 = 0$

$(y+7)(y-6) = 0$

$y = -7$ or $y = 6$

-7 or 6

(2)

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10. Find the equation of the line that is parallel to $2y + 4x = 9$ and passes through the point $(0, 3)$

$2y = -4x + 9$

$y = -2x + 4.5$

$m = -2$

$y = -2x + 3$

(3)

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11. Solve $\frac{x-3}{4} + \frac{x+1}{2} = \frac{11}{16}$

$4(x-3) + 8(x+1) = 11$

$4x - 12 + 8x + 8 = 11$

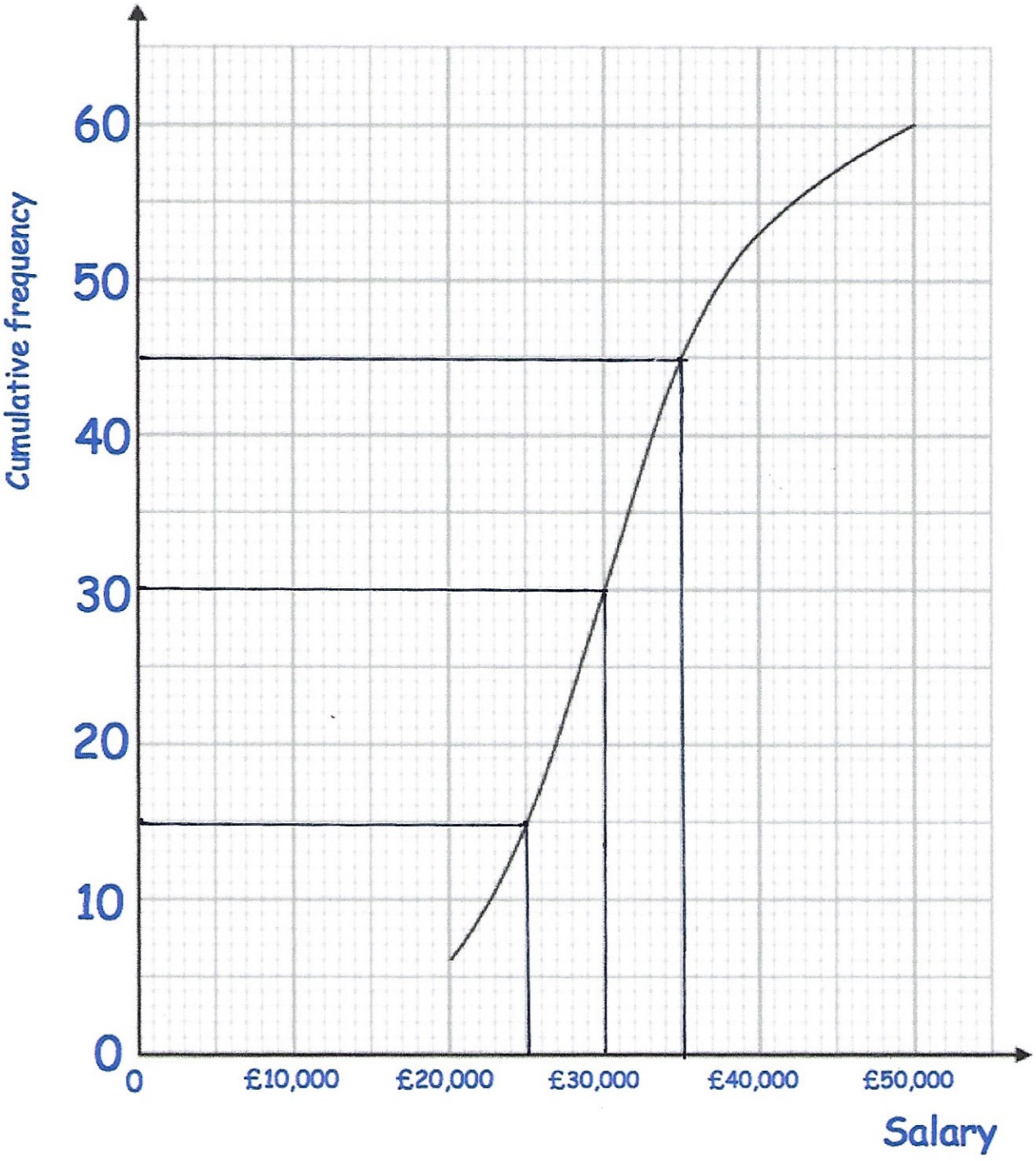
$12x = 15$

$x = 1.25$

$x = 1.25$

(4)

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



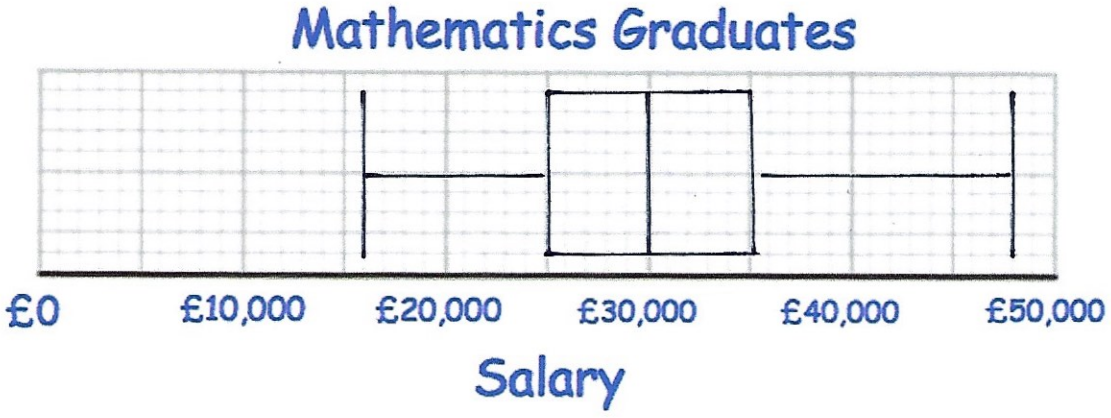
(a) Use the graph to find an estimate for the median salary.

£ 30000

(1)

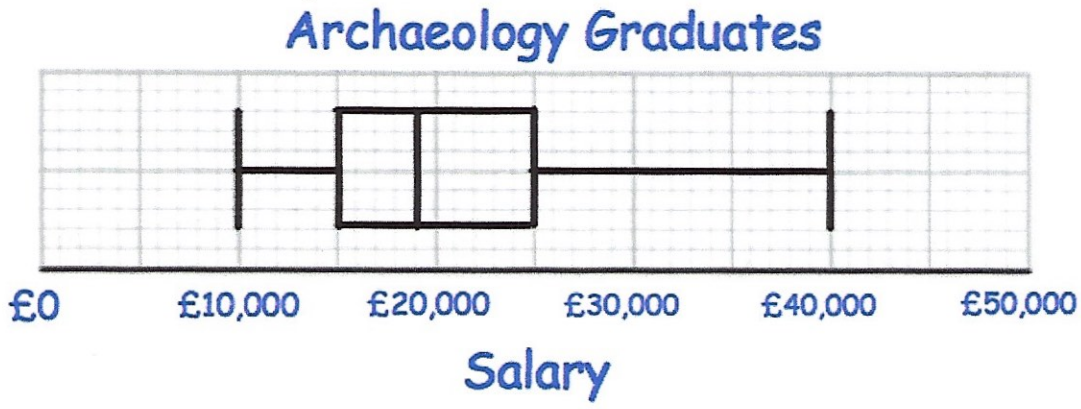
The 60 mathematics graduates
had a minimum salary of £16,000
and a maximum salary of £48,000.

(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 for the mathematics graduates are higher as their median is £30000, compared to a median of £19000. Both distributions have a spread/IQR of £10000, so they have a similar spread.

(2)

13. In 2013, Evan bought a car.

In 2019, Evan sold the car to Grace.
Evan made a loss of 25%

In 2021, Grace sold the car for £15225
Grace made a profit of 45%

Work out how much Evan bought the car for in 2013.

15225 ÷ 1.45 = £10500

10500 ÷ 0.75 = £14000

£ 14000

(3)

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14. The table below shows information about the vehicles sold by a dealership.

Car	Van	Motorbike	Caravan
5112	1048	2948	750

9858

The manager takes a sample of 150 customers, stratified by type of vehicle sold.

Calculate the number of customers who bought motorbikes that should be included in the sample.

$\frac{2948}{9858} \times 150 = 44.856969...$

45 (or 44)

(2)

15. $w = aT$

a = 15 correct to 2 significant figures Min a : 14.5
w = 700 correct to 2 significant figures Max W : 705

Calculate the upper bound for T

$T = \frac{W}{a}$

$Max\ T = \frac{Max\ W}{Min\ a}$ $\frac{705}{14.5}$

48.6207 to 4dp.

(3)

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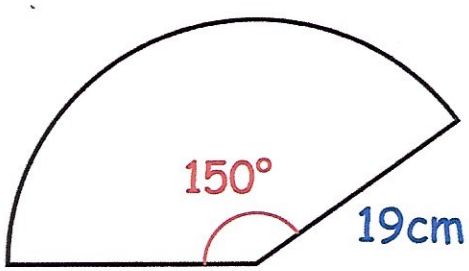
16. The diagram below shows a sector.



Find the perimeter of the sector.

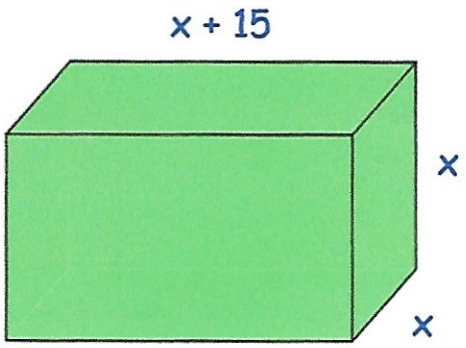
$\frac{150}{360} \times \pi \times 38 = 49.741...$

$49.741... + 19 + 19 =$

87.74 cm

(3)

17. The surface area of this cuboid is $3600cm^2$



(a) Show $x^2 + 10x - 600 = 0$

$x \times x = x^2$

$x(x+15) = x^2 + 15x$

$2x^2 + 4(x^2 + 15x) = 3600$

$6x^2 + 60x - 3600 = 0$

$x^2 + 10x - 600 = 0$ **(4)**

(b) Find the volume of the cuboid.

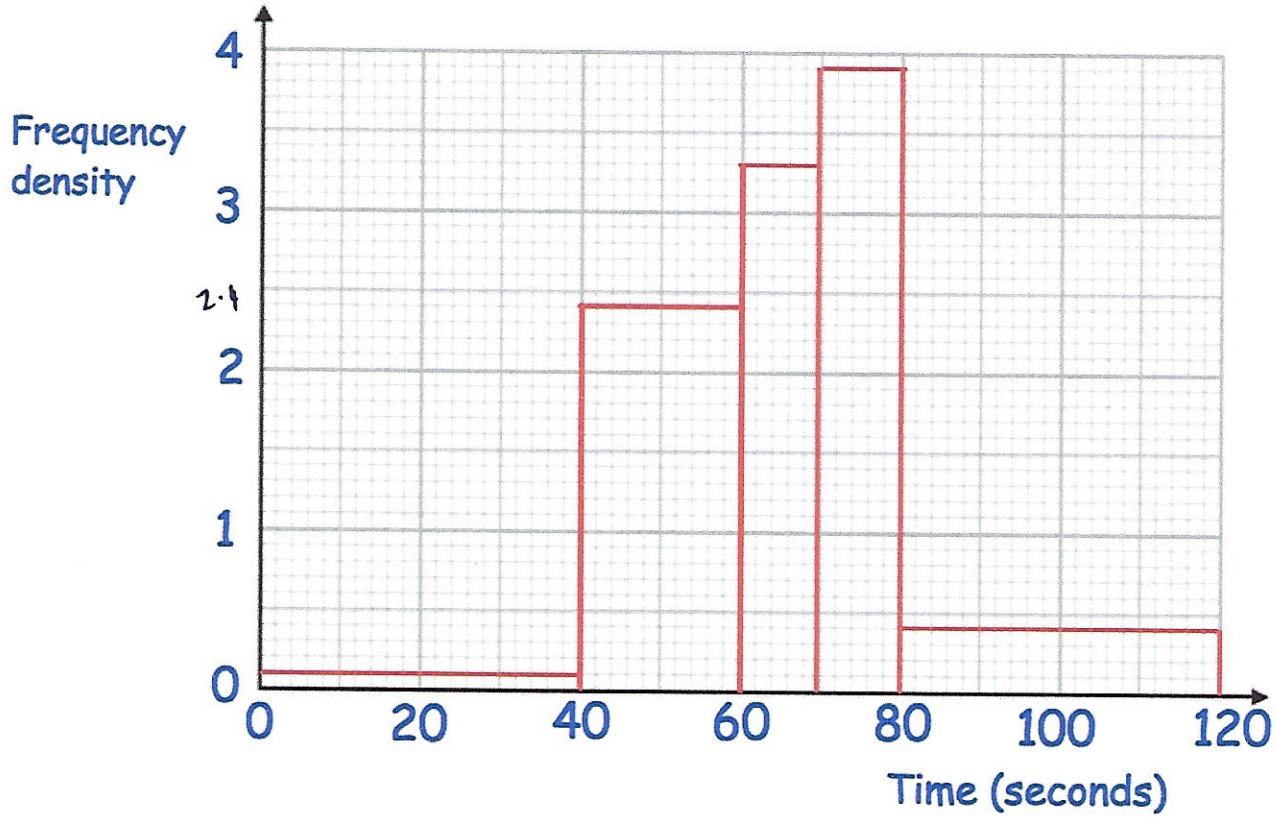
$(x + 30)(x - 20) = 0$

$x = -30$ or $x = 20$

$20 \times 20 \times 35$

14 000 ..... cm^3 **(3)**

18. The histograms shows information about the time taken by 140 students to complete a puzzle.



(a) Complete this frequency table.

Time, t seconds	Frequency
$0 < t \leq 40$	4
$40 < t \leq 60$	48
$60 < t \leq 70$	33
$70 < t \leq 80$	39
$80 < t \leq 120$	16

52

(2)

(b) Calculate an estimate of the median.

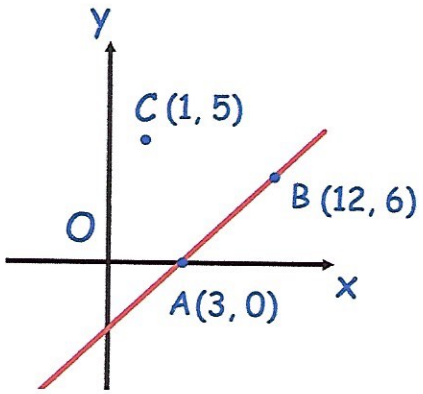
70th

$60 + \frac{18}{33} \times 10$

65·4545... seconds

(3)

19. A straight line passes through the point A(1, 4) and B(5, 16)



Find the equation of the line perpendicular to AB that passes through C.

gradient of AB : $\frac{6-0}{12-3} = \frac{6}{9} = \frac{2}{3}$

gradient of perpendicular line : $= -\frac{3}{2}$

$y = -\frac{3}{2}x + c$

x y

C (1, 5)

$5 = -\frac{3}{2} + c$

$c = 6.5$

$y = -1.5x + 6.5$

(4)

or

$y = -\frac{3}{2}x + \frac{13}{2}$

20. Solve

$$\frac{2}{2x-3} - \frac{3}{x+4} = 2$$

Give your solutions to 4 significant figures

$$\frac{2(x+4) - 3(2x-3)}{(2x-3)(x+4)} = 2$$

$$2x + 8 - 6x + 9 = 2(2x-3)(x+4)$$

$$-4x + 17 = 2(2x^2 + 8x - 3x - 12)$$

$$-4x + 17 = 4x^2 + 16x - 6x - 24$$

$$0 = 4x^2 + 14x - 41$$

$a = 4 \quad b = 14 \quad c = -41$

$$x = \frac{-14 \pm \sqrt{14^2 - 4 \times 4 \times (-41)}}{8}$$

$$x = \frac{-14 \pm \sqrt{852}}{8}$$

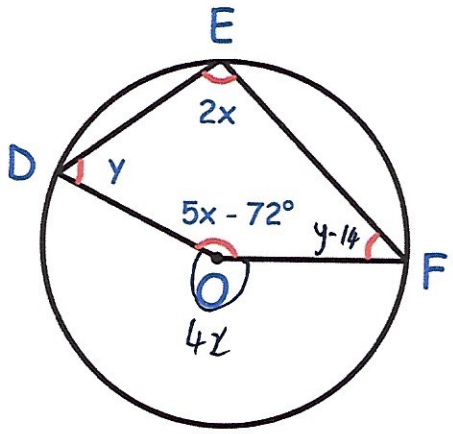
$$x = \frac{-14 + \sqrt{852}}{8} \text{ or } x = \frac{-14 - \sqrt{852}}{8}$$

$x = 1.899$ $\quad x = -5.399$

1.899 or -5.399

(6)

21.



The points D, E and F are points on a circle, centre O.

Angle DEF = $2x$ Angle DOF = $5x - 72°$ Angle EDO = y

Angle EFO is 14° smaller than angle EDO

Work out the value of y

$9x - 72 = 360$

$9x = 432$

$x = 48$

$2 \times 48 = 96$

$5 \times 48 - 72 = 168$

$96 + 168 = 264$

$360 - 264 = 96$

$2y - 14 = 96$

$2y = 110$

$y = 55$

$y =$ 55 °

(5)

22. (a) $(ax^b)^3 = 27x^{12}$ where *a* and *b* are positive integers.

Work out *a* and *b*

$\sqrt[3]{27} = 3$

$12 \div 3 = 4$

a = 3

b = 4

(2)

(b) Factorise $10x^2 - 91xy + 9y^2$

$(10x - y)(x - 9y)$

$(10x - y)(x - 9y)$

(2)

(c) Simplify

$$\frac{x-1}{2x^3} + \frac{x+4}{x^4} \div \frac{4x+16}{x}$$

$\frac{x+4}{2x^3} \times \frac{x^1}{4(x+4)} = \frac{1}{4x^3}$

$\frac{x-1}{2x^3} + \frac{1}{4x^3}$

$\frac{2x-2}{4x^3} + \frac{1}{4x^3} = \frac{2x-1}{4x^3}$

$\frac{2x-1}{4x^3}$

(4)