MS RE4

Q20

GCSE Mathematics Practice Tests: Set 2

Paper 3F (Calculator)

Time: 1 hour 30 minutes

You should have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator.

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **Calculators may be be used.**
- Diagrams are NOT accurately drawn, unless otherwise indicated.
- You must **show all your working out.**

Information

- The total mark for this paper is 80
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1. Write down the value of the 5 in 7.052

Place Value

Uth

$\frac{5}{100}$

(Total 1 mark)

---

2. Simplify $4y - y + 2y$

Simplifying Algebraic Expressions

4 lots - 1 lot + 2 lots = 5 lots = 5y

5y

(Total 1 mark)

---

3. Write 678 980 correct to the nearest ten thousand.

Rounding

8 rounds up ... 680 000

680000

(Total 1 mark)

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4. Find all the factors of 40

Factors

5, 10, 20, 40 | 40 | 8, 4, 2, 1

1, 2, 4, 5, 8, 10, 20, 40

(Total 2 marks)

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money problem

5. Lynn is planning a Christmas party for her badminton club.
Here are her costs.

Food	£176
Drink	£103
Hire of room	£36 per hour

Lynn wants to hire the room for 4 hours.

There will be 28 people at the party.
Lynn will charge these people £15 each.

Will Lynn get enough money to pay all her costs?

You must show your working.

Total costs: Food + Drink + Room Hire
£176 + £103 + Room Hire

Room Hire: £36 × 4 = £144

Total: £176 + £103 + £144 = £423

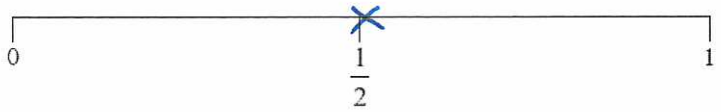
Total Income: 28 × £15 = £420

Conclusion: No since £423 > £420.

(Total 4 marks)

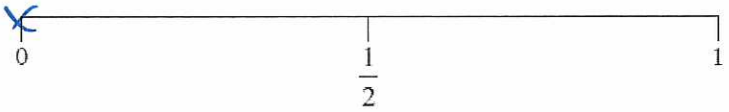
Probability Scale

6. (a) Sabrina throws a fair coin. evens
On the probability scale, mark with a cross (×) the probability that the coin will land on tails.



(1)

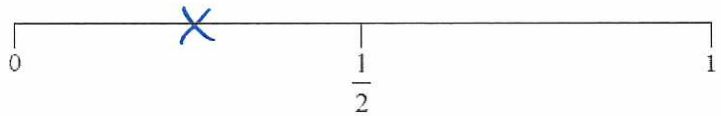
(b) Suresh throws an ordinary 6-sided dice. Cannot happen: Impossible
On the probability scale, mark with a cross (×) the probability that he will throw a 7



(1)

(c) There are three yellow sweets and one blue sweet in a bag.
Graham takes at random a sweet from the bag. "One out of 4" = 1/4

On the probability scale, mark with a cross (×) the probability that he will take a blue sweet.



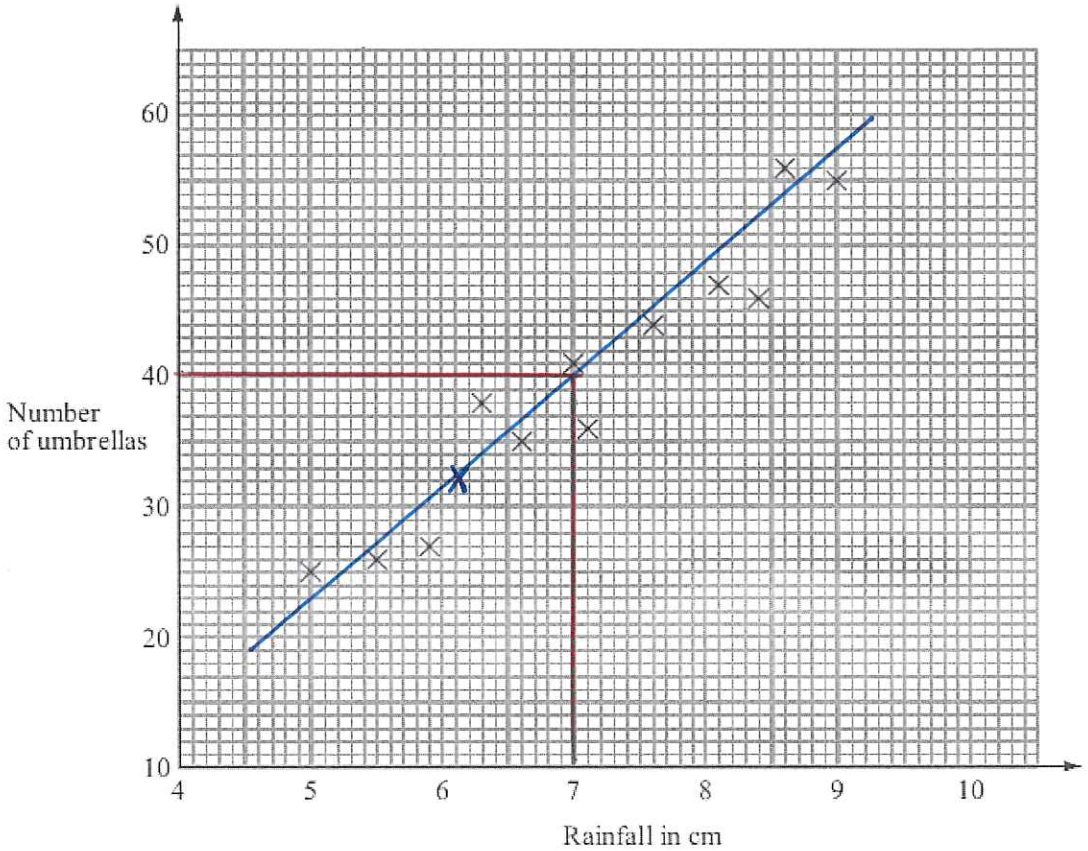
(1)

(Total 3 marks)

Scatter Graphs

7. Mr Wither sells umbrellas.

The scatter graph shows some information about the number of umbrellas he sold and the rainfall, in cm, each month last year.



In January of this year, the rainfall was 6.1 cm.
During January, Mr Wither sold 32 umbrellas.

(a) Show this information on the scatter graph. X marked

(1)

(b) What type of correlation does this scatter graph show?

positive

(1)

In February of this year, Mr Wither sold 40 umbrellas.

(c) Estimate the rainfall for February.

7 cm

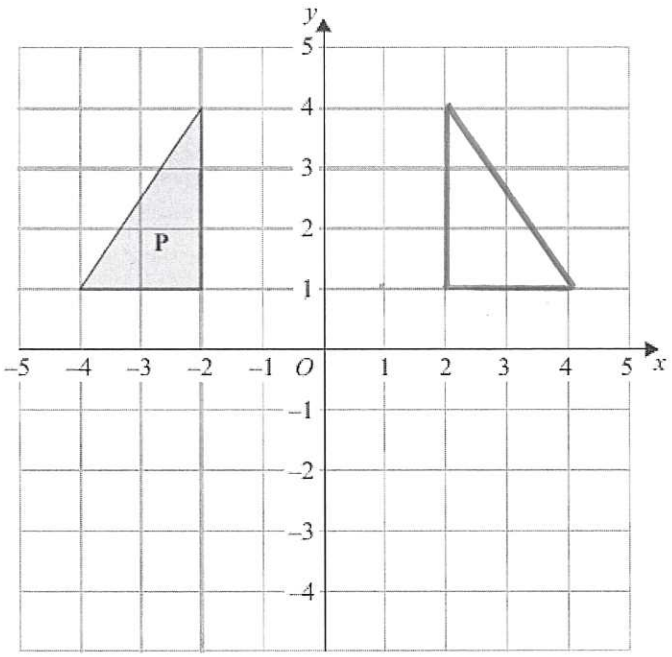
USE THE GRAPH: DRAW LINE OF BEST FIT.

(2)

(Total 4 marks)

Transformations

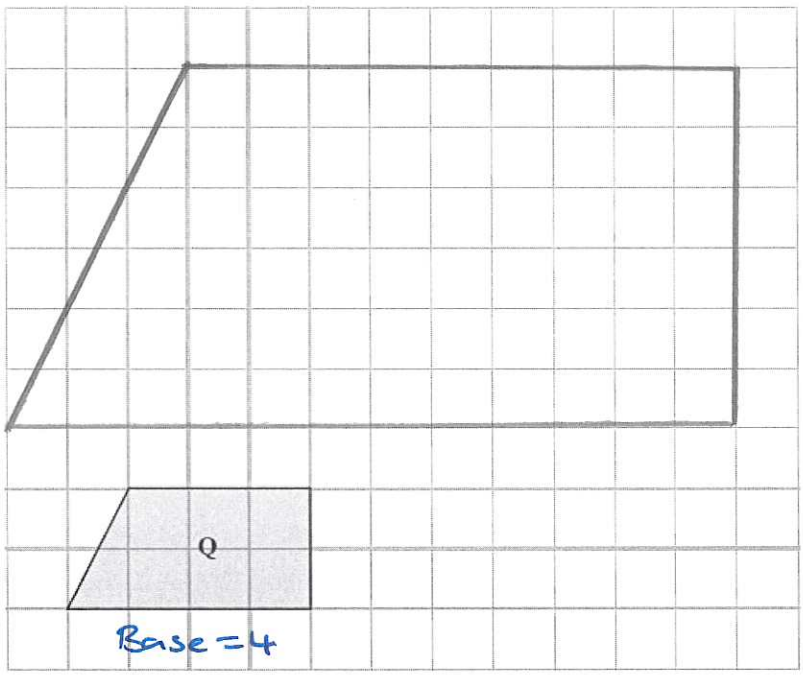
8.



(a) Reflect triangle **P** in the y-axis.

Flip

(2)



(b) Draw an enlargement of shape **Q** scale factor 3

4 × 3 = 12

(2)

(Total 4 marks)

Forming and Solving Equations

9. A pile of sand has a weight of 65 kg.

Some of the sand is put into a small sack. x
The rest of the sand is put into a large sack. $x+15$

The sand in the large sack weighs 15 kg more than the sand in the small sack.

What is the weight of the sand in the small sack?

Small + Large = Total

Total = 65kg: $x + x+15_{kg} = 65kg$

collect: $2x + 15_{kg} = 65kg$

(−15): $2x = 50kg$

Small = x (÷2): $x = 25kg$

..... kg

(Total 2 marks)

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10. Laura is asked to solve the equation ~~$6x + 4 = 10$~~ $6x+3=9$ Solving Equations

Here is her working. Typo!

$6x + 3 = 9$

(−3): $6x = 12$ ✗

(÷6): $x = 2$ ✓

Laura's answer is wrong.
What mistake did she make?

She shouldn't -3 from both sides. But 9-3 = 6

9-3 ≠ 12.

(Total 1 mark)

Converting Units (Exchange Rates)

11. In August 2008, Eddie hired a car in Italy.

The cost of hiring the car was £620
The exchange rate was £1 = €1.25

(a) Work out the cost of hiring the car in euros (€).

£1 : €1.25
(×620) | £620 : €775 ↓ ×620

€ 775

(2)

Eddie bought some perfume in Italy.

The cost of the perfume in Italy was €50
The cost of the same perfume in London was £42

The exchange rate was still £1 = €1.25

(b) Work out the difference between the cost of the perfume in Italy and the cost of the perfume in London.
Give your answer in pounds (£).

CONVERT EVERYTHING TO £

London

£42

Italy

£ : €50
£1 : €1.25

€50 ÷ €1.25 = 40

∴ = £40

Conclusion: Difference = £42 − £40 = £2

£ 2

(3)

(Total 5 marks)

Worded Division

12. An internet bookshop uses this advert.

Each day every 3rd customer gets a mystery prize.
Each day every 20th customer gets free postage and packaging.

On Tuesday the internet bookshop had 150 customers.

(a) How many of the 150 customers got a mystery prize?

$150 \div 3 = 50$

50

(2)

(b) How many of the 150 customers got free postage and packaging?

$150 \div 20 = 7.5$

Can't have 7.5 people $\therefore$ 7 people

7

(2)

(c) How many of the 150 customers got both a mystery prize **and** free postage and packaging?

LCM of 3 and 20 = 60 | mystery prize AND free postage every 60th customer

$150 \div 60 = 2.5$

Can't have 2.5 people $\therefore$ 2 people

2

(2)

(Total 6 marks)

Worded Division (Ratio)

13. Mrs Phillips needs to decide when to have the school sports day.

The table shows the number of students who will be at the sports day on each of 4 days.
It also shows the number of teachers who can help on each of the 4 days.

	Tuesday	Wednesday	Thursday	Friday
Number of students	179	162	170	143
Number of teachers	15	13	14	12

For every 12 students at the sports day there must be at least 1 teacher to help.

On which of these days will there be enough teachers to help at the sports day?
You must show all your working.

Tuesday — Students : Teachers

179 : 15

(÷15) 11.93 : 1 ✓ ENOUGH

Wednesday

162 : 13

(÷13) 12.46... : 1 ✗ NOT ENOUGH

Thursday

170 : 14

(÷14) 12.14... : 1 ✗ NOT ENOUGH

Friday

143 : 12

(÷12) 11.91... : 1 ✓ ENOUGH

(Total for Question 13 is 3 marks)

Conclusion: Tuesday and Fridays

Reverse Percentages

14. 30% of a number is 120
Work out the number.

$30\% = 120$

$(\div 3)$ $10\% = 40$

$(\times 10)$ $100\% = 400$

400

(Total 3 marks)

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15. Show that $7\frac{1}{2} - 4\frac{2}{3} = 2\frac{5}{6}$

Mixed Number Operations

Improper fractions: $7\frac{1}{2} = \frac{15}{2}$ $\quad 4\frac{2}{3} = \frac{14}{3}$

$\therefore \frac{15}{2} - \frac{14}{3}$

Lcm of 2 and 3 = 6

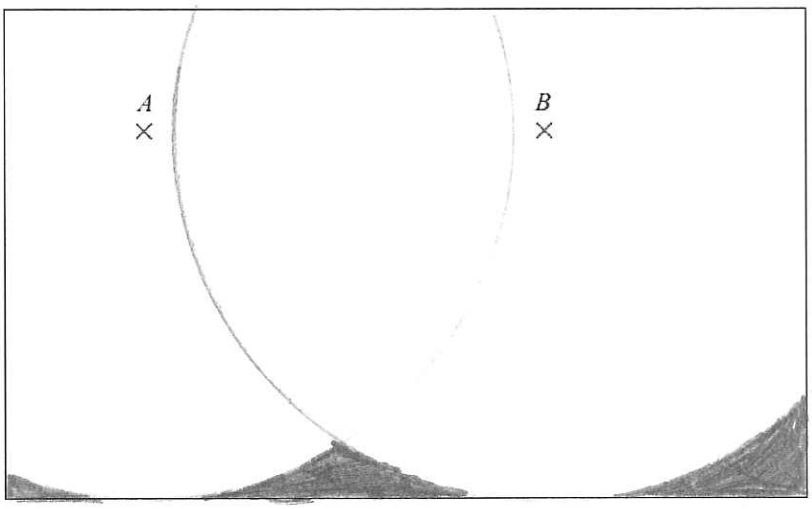
$\therefore \frac{45}{6} - \frac{28}{6} = \frac{17}{6}$

Mixed Number: $\frac{17}{6} = 2\frac{5}{6}$ □

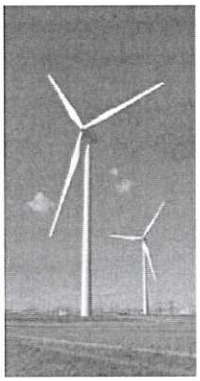
(Total 3 marks)

Loci

16. The diagram shows a map of a field.
The scale of the map is 1 cm represents 20 m.



Wind turbines



A and *B* are two wind turbines in the field.
A third wind turbine is to be put in this field.

1cm : 20m
x5 ↓ ↓ x5
5cm : 100m

There must be at least 100 m between wind turbines.

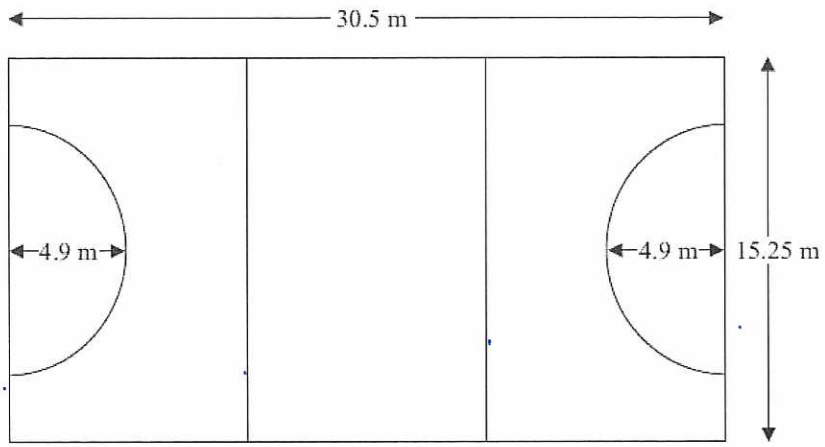
Circles – distance from a point!

Show, by shading, where the third wind turbine can be put.

(Total 3 marks)

Circumference of a circle

17. The diagram shows the lines of a netball court.



The court is made from three rectangles and two semi-circles.
All the corners are right angles.

Mr Handy is painting the lines for the netball court on the floor of a school sports hall.

Work out the total length of the lines of the netball court.
Give your answer correct to the nearest metre.

Length lines ⟷ : $2 \times 30.5\text{m} = 61\text{m}$

Width lines ↕ : $15.25\text{m} \times 4 = 61\text{m}$

Circular lines) (: $C = \pi d$

(diameter = 4.9 × 2) $C = 9.8\pi\text{m}$

Half the circumference ... But there's two of them! ∴ Circular total $= 9.8\pi$

Total Lines : $61_m + 61_m + 9.8\pi\text{m}$

$= 152.787608\text{m}$

$= 153$ (nearest metre)

153 m

(Total 4 marks)

Plotting Straight Lines

18. On the grid, draw the graph of $y = 3x - 2$ for values of x from -1 to 3

$x=0$: $y=3(0)-2=-2$

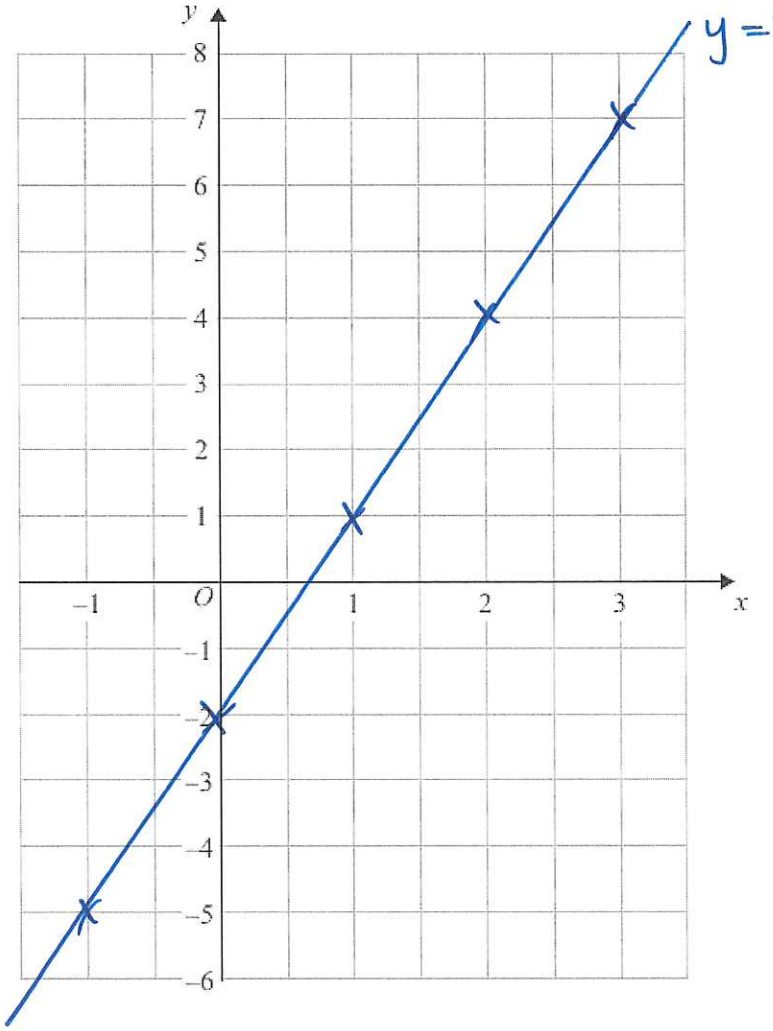
$x=1$: $y=3(1)-2=1$

$x=2$: $y=3(2)-2=4$

$x=3$: $y=3(3)-2=7$

x	-1	0	1	2	3
y	-5	-2	1	4	7

← use pattern



(Total 3 marks)

Forming and Solving Inequalities

19. Abbie is 5 years older than Cathy.
Bhavna is twice as old as Abbie.
The total of their ages is less than 30

What is Bhavna's greatest possible age?

Give your answer as a whole number of years.
You must show all your working.

Cathy = x

Abbie = $x+5$

Bhavna = $2(x+5) = 2x+10$

Total ages < 30	Cathy + Abbie + Bhavna < 30
	$x + x+5 + 2x+10 < 30$
collect	$4x + 15 < 30$
(-15)	$4x < 15$
$(\div 4)$	$x < 3.75$
x is a whole number	$x = 3$ (maximum)
Bhavna $= 2x+10$	Bhavna $= 2(3)+10$
	$= 6 + 10$
	$= \underline{16}$

16

(Total 4 marks)

Pie Charts

20. The table gives some information about the birds Paula sees in her garden one day.

Bird	Frequency
Magpie	15
Thrush	10
Starling	20
Sparrow	27
TOTALS	72

ANGLE

$15 \times 5^\circ = 75^\circ$

$10 \times 5^\circ = 50^\circ$

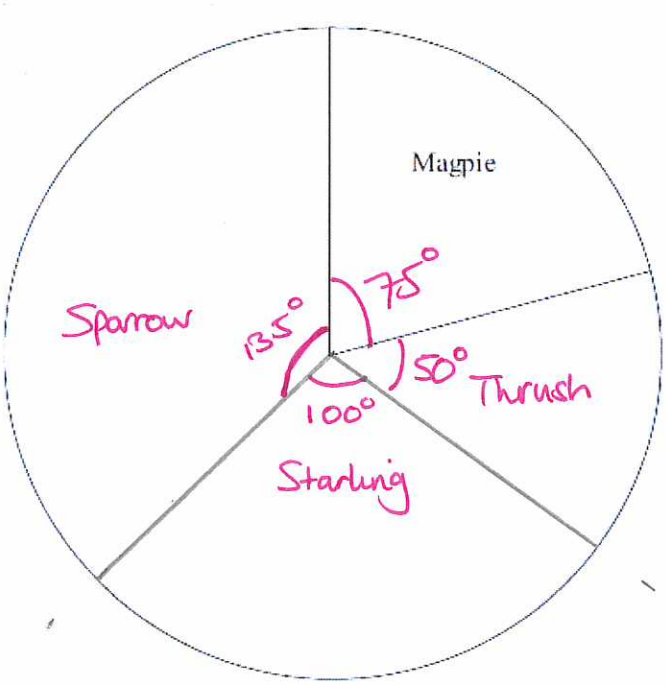
$20 \times 5^\circ = 100^\circ$

$27 \times 5^\circ = 135^\circ$

Complete the accurate pie chart.

72 frequency $= 360^\circ$

$(\div 72)$ | 1 frequency $= 5^\circ$



(Total 3 marks)

Ratio and Proportion

21. There are only red pens and blue pens in a box.
There are 12 red pens in the box.

The probability of taking at random a blue pen from the box is $\frac{2}{3}$

Work out the total number of pens in the box.

$P(\text{blue}) = \frac{2}{3}$ | $\therefore P(\text{red}) = \frac{1}{3}$

$\frac{1}{3} = 12$ pens

$(\times 3)$ | ALL PROBABILITY = 36 pens

36

.....

(Total 3 marks)

money problem

6. Henry is thinking about having a water meter.

These are the two ways he can pay for the water he uses.

Water Meter	No Water Meter
A charge of £28.20 per year plus 91.22p for every cubic metre of water used **1 cubic metre = 1000 litres**	A charge of £107 per year

Henry uses an average of 180 litres of water each day.

Henry wants to pay as little as possible for the water he uses.
Should Henry have a water meter?

Water per year	$365 \times 180\text{L} = 65700$ Litres
Cubic metres per year	$65700 \div 1000 = 65.7\text{cm}^3$
cost of water (pence)	$65.7 \times 91.22\text{p} = 5993.154\text{p}$
cost of water (£)	$= £59.93$
Total cost	$£28.20 + £59.93 = £88.13$
Conclusion	Get a water meter since $£88.13 < £107$.

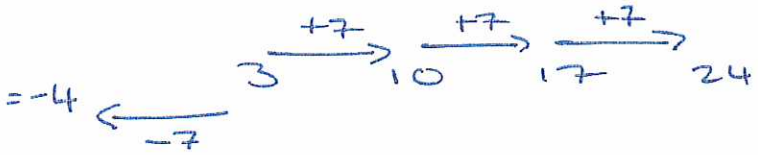
(Total 5 marks)

Linear Sequences

8. Here are the first four terms of an arithmetic sequence.

3 10 17 24

(a) Find, in terms of n, an expression for the nth term of this arithmetic sequence.



$7n-4$

(2)

(b) Is 150 a term of this sequence?

You must explain how you get your answer.

$7n-4=150$

$(+4)$ $7n = 154$

$(\div 7)$ $n = 22$

Yes, 150 is in the sequence - the 22nd term.

(2)

(Total 4 marks)

Reverse Percentages

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1. Each year Wenford Hospital records how long patients wait to be treated in the Accident and Emergency department.

In 2015 patients waited 11% less time than in 2014.
In 2015 the average time patients waited was 68 minutes.

(a) Work out the average time patients waited in 2014.
Give your answer to the nearest minute.

2015: | 100% − 11% = 89%
89% = 68 minutes
(÷89) | 1% = 0.764...
(×100) | 100% = 76.4
Rounding | = 76 minutes (nearest minute)

..... minutes
(3)

The hospital has a target to reduce the average time patients wait to be treated in the Accident and Emergency department to 60 minutes in 2016.

Percentage change

(b) Work out the percentage decrease from 68 minutes to 60 minutes.

% change = $\frac{\text{change}}{\text{original}}$ (×100)

$= \frac{8}{68}$ (×100)

$= 11.7647... \simeq 11.8\%$

11.8 %
(2)

(Total 5 marks)

Converting Units of Area

25. Each length of the side of square B is twice the length of the side of square A.

John says that this means the area of square B is twice the area of square A.

Is John right?
Justify your answer.

No since the area scale factor is length scale factor squared.

(Total 1 mark)

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26. Solve $x^2 + 3x - 10 = 0$

Solving Quadratics

sum = +3 ; Product = -10

10 1
5 2

factorise | $(x+5)(x-2) = 0$

Solve: | $x+5=0$ OR $x-2=0$

$\therefore x = -5$ OR $x = 2$

$x =$ -5 OR 2

(Total 2 marks)

TOTAL FOR PAPER IS 80 MARKS