

Paper 3 June 2019

- 1) £1-50 as a fraction 60p

$$\frac{150}{60} = \frac{5}{2}$$

which is given option

2) $P(\text{six}) = \frac{3}{5}$

$P(\text{two sixes}) = \frac{3}{5} \times \frac{3}{5} = \frac{9}{25}$

which is a given option

- 3) LCM (5, 15, 25)

5	15	25
10	30	50
15	45	75
20	60	
25	75	

LCM is 75

4) $(x-5)(x+3) = 0$
roots are 5 and -3.

- 5) scale factor $\frac{1}{2}$
triangle will have base 2
height 3

Enlargement will confuse some students.

6) Jon has £9-43
Ellie has £6-74
£16-23

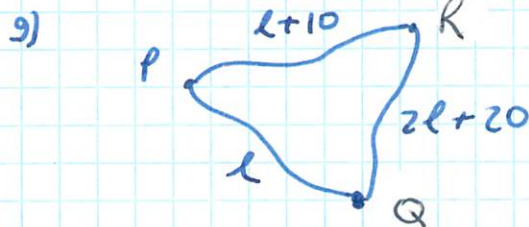
7)

	J	K	
Mass	48	78	grams
Volume	8	13	cm ³
Density	<u>6</u>	<u>6</u>	gram/cm ³

8) $y = 3x - 2$

$3x = y + 2$

$x = \frac{1}{3}(y+2)$



$l + l + 10 + 2l + 20 = 170$

$4l = 140$

$l = 35 \text{ km.}$

Presumably these are continental roads
as all roads in Britain are measured
in miles.

check $35 + 45 + 90 = 170$

- 10) Mia wants to borrow £6000

offer 1 $6000 \times 1.03^2 = 6365.40$

offer 2 $6000 \times 1.01 \times 1.05 = 6363$

So offer 1 is cheaper and Mia is wrong

The sum of money borrowed is
irrelevant. We could have left
it out of the calculation.

11)

	Set A	Set B
mean	$\frac{3}{141} \times 47$	$\frac{8}{1453+x} \times 47$

$8 \times 47 = \frac{1453+x}{5}$

$x = 5 \times 8 \times 47 - 1453$
 $= 427$

check $\text{mean}_A = 141$ $\text{mean}_B = 376$
 $\frac{141}{5} \times 8 = 376$

12) Gradient = 4
Point (5, 23)

A point and a gradient define a straight line and there is a standard equation for this.

$$y - y_1 = m(x - x_1)$$

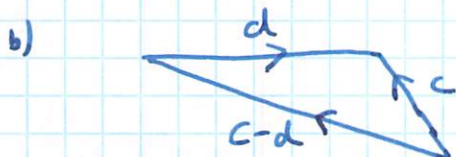
$$y - 23 = 4(x - 5)$$

$$y - 23 = 4x - 20$$

$$y = 4x + 3$$

13) $b = -2a$

the direction is reversed and b is twice as long as a.



Ask your tutor for the explanation sheet of vectors

14)

Boys : Girls

Class X 7 : 8

Class Y 3 : 4

The only true statement is Class X has a greater proportion of boys than class Y.

15) $\frac{a^3 b^2 c}{cd \times ab^2} = \frac{a^2}{b^3 d}$

Simple enough.

16) Sector A Area = $(1.5)^2 r^2 c$
Sector B Area = $(1)^2 r^2 c$
A has the bigger area

c is measured in radians

17) $200 \times 0.03 = 6$
 $200 \times 0.035 = 7$
 $200 \times 0.015 = 3$
 $200 \times 0.01 = 2$

$$\text{range} = 7 - 2 = 5$$

A really neat way would be to calculate

$$200 \times (0.035 - 0.01) = 200 \times 0.025 = 5$$

18 a)

$$x(3x - 9) = 4$$

$$3x^2 - 9x - 4 = 0$$

b) As the question specifies 2 dep places this immediately tells us that the function won't factorise. So we use the formula.

Step 1 write the formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Step 2 specify $a = 3$ $b = -9$ $c = -4$

Step 3 enter values

$$x = \frac{-3 \pm \sqrt{81 + 48}}{6}$$

$$= \frac{-3 \pm \sqrt{129}}{6}$$

$$x = 3.39 \text{ or } -0.39$$

19) This is a box plot question.

Two criticisms.

1) Median drawn at $10\frac{1}{2}$ not 11.

2) If $LQ = 7$ and $UR = 8$ then $VQ = 15$ but plotted at 16.

20) This is a proportional question and every one follows exactly the same pattern.

$$d \propto v^2$$

replace $\propto$ with $=k$

$$d = kv^2$$

Then we are given values for d and v which allows us to calculate k .

$$6 = k20^2$$

$$k = \frac{6}{20^2} = 0.015$$

so we write

$$d = 0.015v^2$$

b) The second part of the question just gives us one value to find the other.

$$d = 0.015 \times 30^2$$

$$= 13.5$$

If you learn the method by rote this is an easy 2 marks

21)

$$\text{blue : yellow}$$

$$7 : 3$$

As yellow is bought in even litre tins double the ratio.

$$14 : 6$$

Suppose he buys 14 tins

$$700 \text{ litres} : 300 \text{ litres}$$

$$300 \text{ litres} = 15 \text{ tins yellow}$$

$$\text{so } 14 \text{ tins blue cost } £3150$$

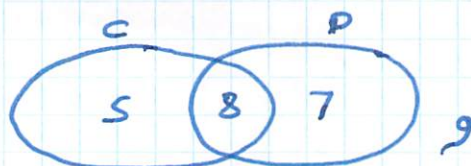
$$15 \text{ tins yellow cost } £1200$$

and he has 200 tin green

$$\text{so } \frac{(3150 + 1200) \times 1.4}{200}$$

$$= £30.45$$

22)



Prob (cat or dog but not both)

$$= \frac{7+5}{29} = \frac{12}{29}$$

23)

$P(\text{cat} | \text{dog})$ means probability cat given that already has a dog.

$$P(\text{cat} | \text{dog}) = \frac{8}{7+8} = \frac{8}{15}$$

23)

$$y = 2^x \text{ given}$$

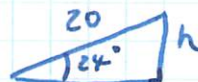
$$\text{asked to draw } y = 3^x$$

$$y = 3^x$$



The curves intersect at $x = 0$
 $y = 3^x$ is below on the left and above on the right.

24)



$$\sin 24^\circ = \frac{h}{20}$$

$$\text{so } h = 20 \sin 24^\circ$$

$$\text{Volume} = 150 \times 20 \sin 24^\circ$$

$$= 1220 \text{ cm}^3$$

25) a) To map $B \leftrightarrow D$ keep keep A and C invariant means we rotate the square about line $y = 1$

b) If the invariant point is $(0, 1)$ we must be rotating about this point 180°

26) $g(x) = 16 - x$

$h(x) = x^3$

$g h(x) = 16 - x^3$

so $16 - x^3 = 24$

$x^3 = -8$

$x = -2$ ✓

That wasn't too difficult

27)

if larger circle is

$x^2 + y^2 = 144$

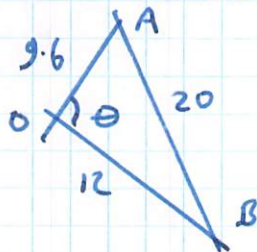
radius $OB = 12$

radius smaller larger

$\frac{12}{5} \times 4 : \frac{5}{12} \times \frac{12}{5}$

radius smaller = $\frac{4 \times 12}{5}$
= 9.6

so now we can draw triangle



and to find θ we use a variation of the cosine formula

$\cos \theta = \frac{b^2 + c^2 - a^2}{2bc}$

where $b = 9.6$ $c = 12$ $a = 20$

$\theta = 135^\circ$ ✓

28) Distance is given by area under the curve.

Split into 3 sections

Area A = $\frac{1}{2} \times 5 \times 8$

Area B = $\frac{1}{2} (8+9) \times 4$

Area C = $\frac{1}{2} \times 3 \times 9$

Total = $\frac{1}{2} (5 \times 8 + 17 \times 4 + 3 \times 9)$
= $67\frac{1}{2}$ m.

However actual area of (3) is less than an assumed triangle

so distance run $< 67\frac{1}{2}$ m. ✓

b) Acceleration in first 9 sec

= $\frac{V-u}{t} = \frac{9-0}{9}$

= 1 m/sec^2 ✓

ROBERT GOODHAND