Paper 1 NOV. 17

1) $\sqrt{2^6+6^2} = \sqrt{64+36}$
$= \sqrt{100}$
$= 10$

Note the $\sqrt{}$ sign means "find the positive square root" only. It is a function and functions can only have one answer for any input. Depending on the circumstances we might add $\pm$ in front of the $\sqrt{}$.

2) 800 million $= 800\,000\,000$
$= 8 \times 10^8$

3) $(4a^5)^2 = 4a^5 \times 4a^5$
$= 16a^{10}$

4) $y = 10/x$
so $x = 10/y$
if x doubles y halves
$\div 2$

5) $(x^2 - 100)$
this is called the difference of two perfect squares.
Remember this
$(x^2 - 100) = (x+10)(x-10)$

6) $(\sqrt{3})^2 \times (\sqrt{2})^2$
$= 3 \times 2 = 6$

7) Area $\frac{1}{4}$ circle $= \frac{1}{4}\pi r^2$
$= \frac{1}{4}\pi 6^2$
$= 9\pi$

8) Lets suppose the numbers were
10 + 20 + 40
Max sum is 14 + 24 + 44
$= 82$

9) Suppose we had 5 integers
6 7 8 9 10 range = 4
so the only expression that gives the correct answer is $n-1$

10) Area one isoceles $\triangle \frac{1}{2}bh$
Total area $= 3 \times \frac{1}{2}bh$
$= \frac{3}{2}bh$.
I could have used area trapezium
$= \frac{1}{2}(b+2b)h = \frac{3}{2}bh$.

b) $b : s$
$2 : 3$
$2s = 3b \quad s = \frac{3}{2}b$
so perimeter $= 3b + 2 \times \frac{3}{2}b$
$= 6b$

b) $7x + 6 > 1 + 2x$
$5x > -5$
$x > -1$

11) $90 + x + 2x + 10 + 2x = 360$

$5x = 260$

$x = 52°$

so C is $= 114°$

So $P(C) = \frac{114°}{360°} = \frac{19}{60}$

of cowse this answer is independent of how many angles there are in a complete revolution.

12) $\frac{0.526 \times 39.6^2}{\sqrt{97.65}}$

$\simeq \frac{0.5 \times 40^2}{\sqrt{100}} \simeq \frac{800}{10}$

$\simeq 80$

13)

	x : y		
×8	7 : 4	11	88
	56 : 32		88

$x - y = 56 - 32 = 24$

14) The turning angle of each polygon must be 30°

$\frac{360}{30} = 12$ sides.

15) Meal deal combinations are

$7 \times 5 \times 3 = 105$

combinations are when order doesn't matter. permutation are when order does matter.

most combination locks should really be called permutation locks.

b) 2 sandwiches have cheese
3 drinks are fizzy

combinations are now

$2 \times 3 \times 3 = 18$

$P(\text{cheese and fizzy}) = \frac{18}{105}$

$= \frac{6}{35}$

16) Rate of water $= \frac{\Delta l}{\Delta t}$

$= \frac{120}{8}$

$= 15$ litres/min.

17)

	A : B
length	$l : 2l$
area	$l^2 : 4l^2$
Vol.	$l^3 : 8l^3$

Think about this  $1 \times 1 \times 1 = 1$

 $2 \times 2 \times 2 = 8$

Alex is wrong and likely to fail his GCSE unlike you.

18) $(2x + 3)(5x - 2)$

roots are $-\frac{3}{2}$ and $\frac{2}{5}$

19) $b + c = 180°$ (interior angles)

$a + c = 360 - 65 - 115$

$= 180°$

if $a + c = 180$ and $b + c = 180°$

then $a = b$

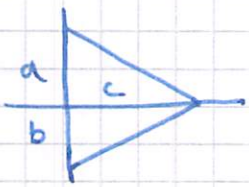
I think this is one of Aristotle's Axioms of Logic. It's not provable.

20) The median is the most appropriate because one person exercises far more than the others.

Mean. Not appropriate for reason above

Mode. Not appropriate. Everyone has a different exercise time.

21)



$\text{Area} = \frac{1}{2}(a+b)c = 28$

$c(a+b) = 56$

say $= 7 \times 8$

so C is $(7, 0)$

and A could be $(0, 5)$

B could be $(0, -3)$

22) Plot cumulative frequency

		cumulative
$40 < x \leq 50$	6	6
$50 < x \leq 60$	16	22
$60 < x \leq 70$	28	50
$70 < x \leq 80$	10	60

We plot at the top of the range.

The line is here

$40 < x \leq 50$

lower quartile 56 mpg

median not asked

upper quartile 68 mpg

interquartile range $68 - 56 = 12$ mpg.

23) $y = (x+3)^2 + 5$

-ve, +ve

turning point $(-3, 5)$ ✓

Ask for the quadratics worksheet if you don't understand this.

24) The feature of cyclic quadrilaterals is that opposite angles add to 180°

$x : y$

$\times 15$ ($5 : 7$) $\times 15$ 12 180

$75 : 105$ 180 180

$w = 180 - (75 + 20)$

$= 85°$

25) 15 machines take 8 hours

Note $15 \times 8 = 120$

Let's suppose the order has 120 elements

So each machine completes $\frac{1 \text{ element}}{\text{hour}}$

In 6 hours 15 machines complete 90 elements

so 30 elements take 12 machines

$\frac{30}{12} = 2\frac{1}{2}$ hours

so each machine works $2\frac{1}{2}$ hours.

$+ 6 = 8\frac{1}{2}$ hours

26) $0.\dot{7} = \frac{7}{9}$

now $0.\dot{7} \div 10 = 0.0\dot{7}$

$\frac{7}{9} \div 10 = \frac{7}{90}$

To me this seems a particularly pointless question. Why not just ask "Express $0.0\dot{7}$ as a fraction"

b) $10l = 2.7777\ldots$

$l = 0.2777\ldots$

$9l \quad 2.5$

$l = \frac{2.5}{9} = \frac{25}{90}$

An exercise in how to make something simple complicated.

27) black red
8 3 11

P(red and red) $= \frac{3}{11} \times \frac{2}{10} = \frac{6}{110}$

P(black and black) $= \frac{8}{11} \times \frac{7}{10} = \frac{56}{110}$

P(same colour) $= \frac{62}{110} = \frac{31}{55}$ ✓

28) $x^2 + y^2 = 36$

$x^2 + y^2 = 6^2$

6 is the radius.

so as OA and OB are radii

A is (0, 6) B is (6, 0)

so M is (3, 3) ✓

Now equation COM.

2 points (0, 0) (3, 3)

x_1, y_1 x_2, y_2

$\frac{y - y_1}{y_2 - y_1} = \frac{x - x_1}{x_2 - x_1}$

$\frac{y}{3} = \frac{x}{3}$ ✓

so $3y = 3x$ so $y = x$

so now we want intersection

$x^2 + y^2 = 36$ with $y = x$

so $2x^2 = 36$

$x^2 = 18$

$x = \sqrt{18} = 3\sqrt{2}$

or $-3\sqrt{2}$

By symmetry y coord same

Coordinates C are

$(-3\sqrt{2}, -3\sqrt{2})$ ✓

29. $y = \sin x°$

coordinates P are (180, 0)

coordinates Q are (−270, 1) ✓

30) $81^{-\frac{1}{4}} = \frac{1}{\sqrt[4]{81}}$

$= \frac{1}{3}$ ✓

b) $16 \times 8^{2x} = 2^4 \times (2^3)^{2x}$

$= 2^4 \times 2^{6x}$

2^{4+6x} ✓

ROBERT GOODHAND