

Paper 1 November 2023

1) LCM (20, 25)

Simple method

multiples 25: 25 50 75 100

Here it is

strict method

$$\text{Factors } 20 = 2 \times 2 \times 5$$

$$\text{Factors } 25 = 5^2$$

$$\text{LCM} = 2^2 \times 5^2$$

$$= 100$$

2) Find exterior angle
regular hexagon

$$\text{Exterior} = \frac{360}{6}$$

$$= 60^\circ$$

3) Find midpoint
 $A(2, 0)$ $B(0, -4)$

$$\text{Midpoint} = \left(\frac{2+0}{2}, \frac{0-4}{2} \right)$$

$$= (1, -2)$$

4) Simplify $a+3a \div a$

$$= a+3$$

5) Work out $(8^2 \times 8) \div (8^3 \div 8^5)$

$$= 8^2 \div 8^4$$

$$= \frac{1}{8} = 0.125$$

6) Examining Scatter graph

a) strong positive correlation

b) Reading off

9000 downloads

= 5400 sales

$$\text{Earnings} = 9000 \times 2.5$$

$$+ 5400 \times 3$$

$$= 22500 + 16200$$

$$= 38700$$

7) 70% of x is 350
what is 120%

$$x = \frac{350}{0.7} \times 1.2$$

$$= 500 \times 1.2$$

$$= 600$$



equal areas

$$6k = 2k + 3m$$

$$4k = 3m$$

$$k:m \text{ is } 3:4$$

9) Quadratic Graph
given

for solutions look where
curve crosses the x-axis

Answers 2.5 or 9.5

10) Shape A circle
radius $\frac{\sqrt{17}}{2}$

Shape B sector
 60° radius 5

which has greater area

$$A = \pi \left(\frac{\sqrt{17}}{2} \right)^2$$
$$= \frac{\pi 17}{4} = 4.25$$

$$B = \frac{1}{6} \pi 5^2$$
$$= \pi \frac{25}{6} = 4.16$$

so Shape A

11) Factorise $x^2 + 2x - 24$

$$= (x + 6)(x - 4)$$

12) write 2×10^3 as ordinary
number

$$= 2000$$

12b)

$$(2 \times 10^3) : (5 \times 10^{-1})$$

$$\Rightarrow 2000 : 0.5$$

$$\Rightarrow 4000 : 1$$

13.

$$5(2x + d) = cx + 30$$

$$10x + 5d = cx + 30$$

$$\text{so } c = 10$$

$$5d = 30$$

$$d = 6$$

14)

Revision

History: French dict

7 : 2 S

28 : 8 20

Total revision time = 35

15)

Box Plot given.

Fastest time (lowest)
= 16 min.

Average times

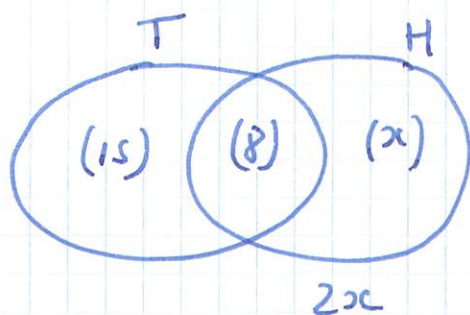
compare medians

2019 was faster than 2020

for consistency look at IQR

2019 and 2020 had
equivalent IQR
so consistent.

16.



$$\sum = 80$$

Prob(H)

$$15 + 8 + x + 2x = 80$$

$$x = 19$$

$$P(H) = \frac{27}{80}$$

$$P(T/H) = \frac{8}{23}$$

17. x and y are integers

$$\textcircled{1} \quad 8 \leq 4x \leq 20$$

$$\textcircled{2} \quad y - 3x < 12$$

largest possible value y

$$\textcircled{1} \quad 2 \leq x \leq 5$$

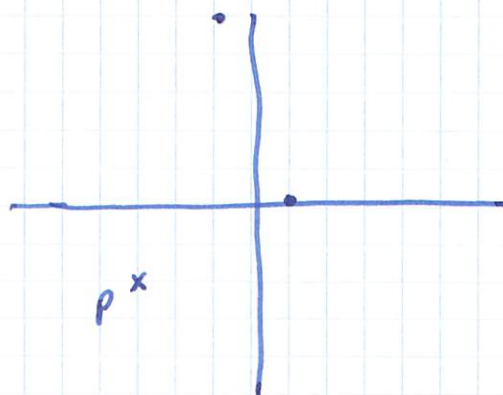
$$\text{choose } x = 5$$

$$y - 15 < 12$$

$$y < 27$$

so largest possible
value y is 26

18.

Is a transformation
question.

P → Q rotation (1, 0)
90° clockwise

so Q is at (-1, 5)

(you can ask for tracing paper)

transformation back to P

by rotation 90° anti-clockwise
about P

by translation $\begin{bmatrix} -2 \\ -6 \end{bmatrix}$

b) An invariant transformation
is one that doesn't move

$$19) \quad 0.\dot{4} + 0.0\dot{7}$$

$$= \frac{4}{9} + \frac{7}{90}$$

$$= \frac{47}{90}$$

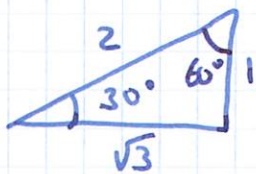
20. x and y are acute angles

$$\sin x = \frac{\sqrt{3}}{2}$$

$$\tan y = 1$$

$$w = 3x - 2y$$

find $\cos w$.



x must be 60°

y is 45°

$$w = 3 \times 60 - 2 \times 45$$

$$w = 180 - 90 = 90$$

$$\cos 90^\circ = 0^\circ$$

4. $f(x) = \frac{x-9}{8}$

$$g(x) = 2x^2 + 9$$

$$h(x) = 4x$$

solve $f^{-1}(x) = g(h(x))$

$$y = \frac{x-9}{8}$$

$$8y = x - 9 \Rightarrow x = 8y + 9$$

$$f^{-1}(x) = 8x + 9$$

$$g(h(x)) = 2(4x)^2 + 9 = 16x^2 + 9$$

so we have

$$8x + 9 = 32x^2 + 9$$

$$8x = 32x^2$$

$$32x^2 - 8x = 0$$

$$8x(4x - 1) = 0$$

$$\text{so } x = 0$$

$$\text{or } x = \frac{1}{4}$$

22. given cyclic quadrilateral

a, b, c, d in order

$$a : b : c$$

$$9 : 5 : 3$$

$$a + c = 180^\circ$$

$$a : c$$

$$9 : 3$$

$$135 : 45$$

$$12 \times 15 \rightarrow 180$$

$$\text{so } b = 75$$

$$\text{so } d = 105^\circ$$

we didn't actually have to work out a and c .

23. Work out

$$\frac{7}{\sqrt{2}} \times \frac{\sqrt{3}}{\sqrt{10}}$$

given as $\frac{x\sqrt{15}}{y}$

$$= \frac{7\sqrt{3}}{\sqrt{20}}$$

multiply top and bottom by 25

$$= \frac{7\sqrt{3} \cdot 25}{\sqrt{20} \cdot 25}$$

$$= \frac{7\sqrt{3}\sqrt{5}}{\sqrt{20}\sqrt{5}}$$

$$= \frac{7\sqrt{15}}{\sqrt{100}} = \frac{7\sqrt{15}}{10}$$

so $x = 7$ $y = 10$

24. Line A perpendicular to B
gradient A = -2

so gradient B = $\frac{-1}{-2} = \frac{1}{2}$

25) n^{th} term is r^n $r > 0$

2nd term is $\frac{8}{9}$

work out 3rd term

$$r^2 = \frac{8}{9}$$

$$r = \frac{\sqrt{8}}{3} = \frac{2\sqrt{2}}{3}$$

$$r^3 = \frac{2^3 \sqrt{2}^3}{3^3} = \frac{8 \cdot 2 \cdot \sqrt{2}}{27} = \frac{16\sqrt{2}}{27}$$

26. Work out $(5\frac{1}{16})^{\frac{1}{4}}$

$$= \left(\frac{81}{16}\right)^{\frac{1}{4}} = \frac{3}{2}$$

b) Write $(49^m)^{2.5}$

as a power of 7 in terms m.

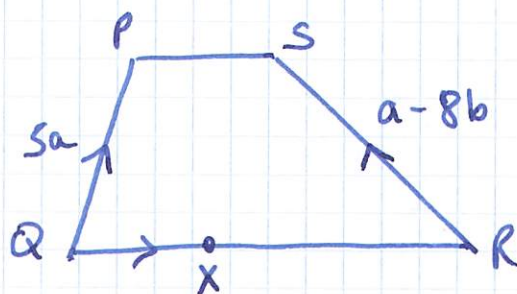
$$(7^2)^{2.5m}$$

$$= 7^{5m}$$

27. $x^2 < 16$

$$\Rightarrow -4 < x < 4$$

28.



$$QX = 2a + 4b$$

$$QX:QR \text{ is } 2:3$$

$$XR = 3a + 6b$$

$$\vec{QR} + \vec{RS} + \vec{SP} = \vec{QP}$$

$$5a + 10b + a - 8b + \vec{SP} = 5a$$

$$\vec{PS} = a - 2b$$

$$\vec{QR} = k(a - 2b)$$

so PQRS is a parallelogram.

2).
Three graphs $\left\{ \begin{array}{l} y = \sin x \\ y = \cos x \\ y = \tan x \end{array} \right.$

which passes through
 $(180, -1)$

it's $\cos x$ that passes
through $(180^\circ, -1)$

which passes through
 $(270, +1)$

it's none of them.