

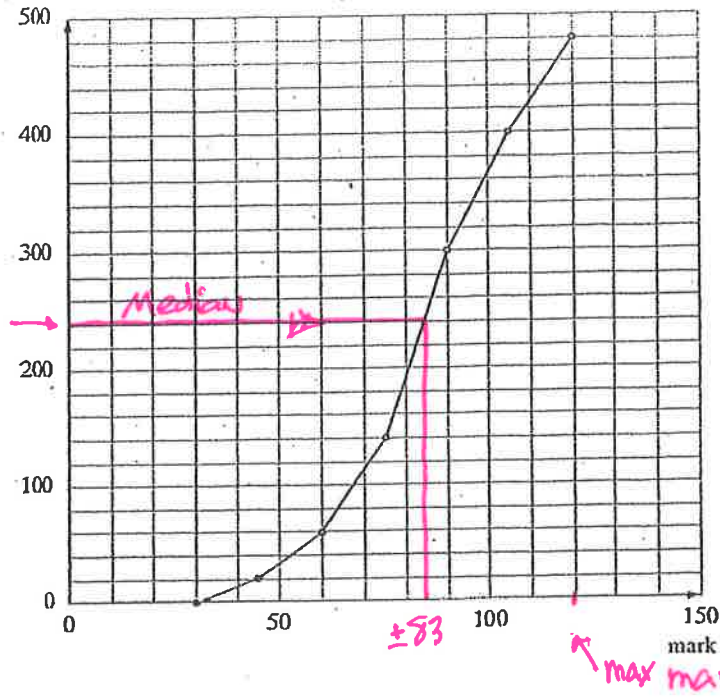
MULTI-TOPIC REVIEW QUESTIONS going back to September

Key
Name _____

1

The cumulative frequency graph below displays the marks scored by year 12 students from a cluster of schools in a common trial mathematics exam.

Trial mathematics exam

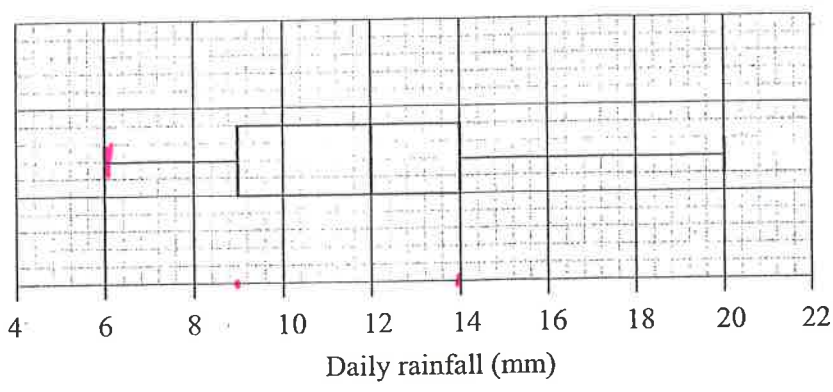


Find:

- a how many students sat for the examination **480**
- b the probable maximum possible mark for the exam **120**
- c the median mark **83 marks (±)**

2

The daily rainfall for the town of St. Anna is collected over a 20-day period of time. The collected data are represented in the box and whisker plot below.



- (a) Write down
 - (i) the lowest daily rainfall; **6**
 - (ii) the highest daily rainfall. **20** [2 marks]
- (b) State what the value of 12 mm represents on the given diagram. [1 mark]
- (c) Find the interquartile range. **Median rainfall**
 $14 - 9 = 5 \text{ mm}$ [2 marks]
- (d) Write down the percentage of the data which is less than the upper quartile. **75%** [1 mark]

- 3 In an experiment, a number of fruit flies are placed in a container. The population of fruit flies, P , increases and can be modelled by the function

$$P(t) = 12 \times 3^{0.498t}, \quad t \geq 0,$$

where t is the number of days since the fruit flies were placed in the container.

- (a) Find the number of fruit flies
- (i) which were placed in the container;
 - (ii) that are in the container after 6 days. [4]

The maximum capacity of the container is 8000 fruit flies.

- (b) Find the number of days until the container reaches its maximum capacity. [2]

Working:

(a) (i) $P(0) = 12(3)^{0.498(0)}$
 $= 12$

(ii) $P(6) = 12(3)^{0.498(6)}$
 $= 319.756 \dots = 320$

b) $8000 = 12(3)^{0.498t}$
 divide
 $\frac{8000}{12} = 3^{0.498t}$

can solve graphically
 or use
 logarithms

$t = 11.9$ days

Answers:

- (a) (i) 12 fruit flies
 (ii) 320 fruit flies
 (b) 11.9 days

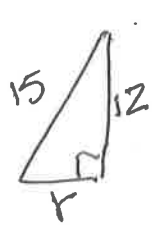
4

A solid right circular cone has a base radius of 21 cm and a slant height of 35 cm. A smaller right circular cone has a height of 12 cm and a slant height of 15 cm, and is removed from the top of the larger cone, as shown in the diagram.

diagram no. to scale

See your IB formula sheet for formulas.

a) Proportion



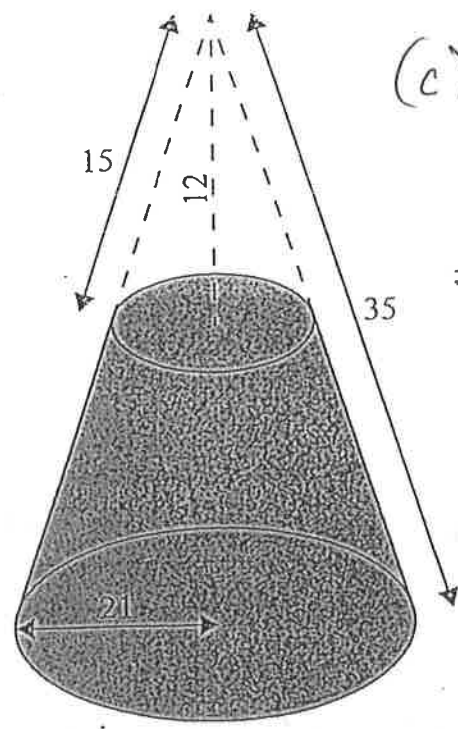
$$r^2 + 12^2 = 15^2$$

$$r^2 = 15^2 - 12^2$$

$$r = \sqrt{15^2 - 12^2}$$

$$r = \sqrt{81} = 9$$

$r = 9 \text{ cm}$



(c) Area of Curved Cone (all of it)

$$= \pi r l$$

$$= \pi(21)(35)$$

$$= 2309 -$$

curved area of truncated cone

$$2309 - 424$$

$$= 1885 \text{ cm}^2$$

- (a) Calculate the radius of the base of the cone which has been removed.
- (b) Calculate the curved surface area of the cone which has been removed.
- (c) Calculate the curved surface area of the remaining solid.

(This question continues on the following page)

(b) $A = \pi r l$

$$= \pi(9)(15)$$

$$= 135\pi$$

$$\approx 424 \text{ cm}^2$$

(c) TOTAL area of remaining TRUNCATED CONE

$$= \text{Curved area} + \text{Bottom circle} + \text{TOP circle}$$

$$= 1885 + \pi(21)^2 + \pi(9)^2$$

$$= 3524.9 \dots$$

$$= 3500 \text{ cm}^2$$

- 5 Consider the quadratic function $f(x) = ax^2 + bx + 22$.
The equation of the line of symmetry of the graph $y = f(x)$ is $x = 1.75$.

(a) Using only this information, write down an equation in terms of a and b . [1]

The graph intersects the x -axis at the point $(-2, 0)$.

(b) Using this information, write down a second equation in terms of a and b . [1]

(c) Hence find the value of a and of b . [2]

The graph intersects the x -axis at a second point, P.

(d) Find the x -coordinate of P. [2]

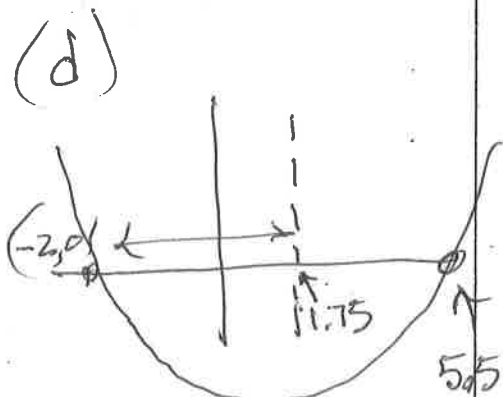
Working:

(a) center of a parabola (from formula sheet) $x = -\frac{b}{2a}$
 $1.75 = -\frac{b}{2a}$ ~~multiply~~ \rightarrow multiply by $2a$ $3.5a = -b$

(b) $(-2, 0)$ $f(x) = ax^2 + bx + 22$
 $0 = a(-2)^2 + b(-2) + 22$
 $0 = 4a - 2b + 22$

(c) $b = -3.5a$
 $4a - 2b + 22 = 0$
 $4a - 2(-3.5a) + 22 = 0$
 $4a + 7a + 22 = 0$
 $11a = -22$
 $a = -2$

$b = -3.5(-2)$
 $= 7$



Answers:

- (a) $3.5a + b = 0$
 (b) $4a - 2b + 22 = 0$
 (c) $a = -2$ $b = 7$
 (d) $(5.5, 0)$