

8 Rates, Ratios and Proportions

Challenging Worksheet

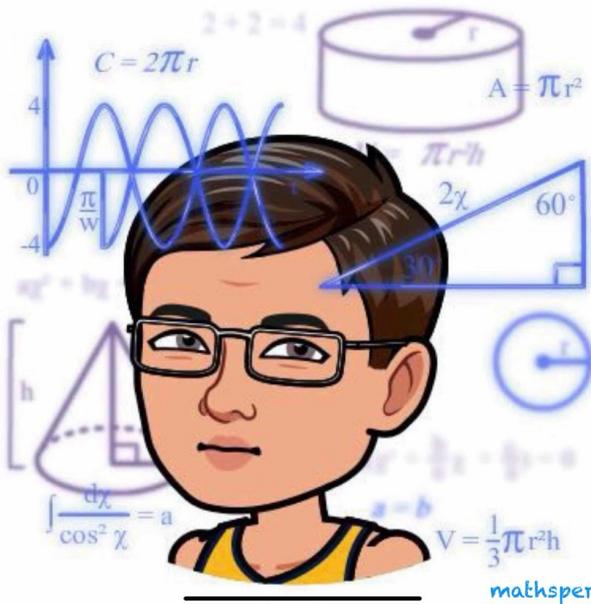


1. In a factory, all the machines produce toy cars at the same rate. It is known that 5 machines can produce 5 000 toy cars in 5 hours. How many toy cars can 10 machines produce in 10 hours?

Solution

97807453

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Mathematical diagrams and formulas visible in the background include:

- Circle circumference: $C = 2\pi r$
- Circle area: $A = \pi r^2$
- Cylinder surface area: $\pi r^2 + 2\pi r h$
- Cylinder volume: $V = \frac{1}{3}\pi r^2 h$
- Right-angled triangle with angles 30° , 60° , and 90° , and sides 2χ and χ .
- Graph of a sine wave with amplitude 4 and period $\frac{\pi}{w}$.
- Integration formula: $\int \frac{dx}{\cos^2 \chi} = a$
- Algebraic equation: $a = b$

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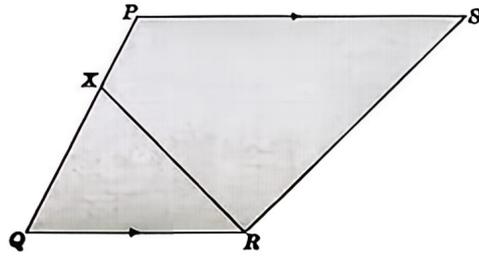
2. Anna and Barry have some almonds. If Barry gives one-third of his almonds to Anna, the numbers of almonds of Anna and Barry will be in the ratio 3 : 2. Find the original ratio.

Solution

3. Last year, Mr Wong planned to allocate a sum of money among his three sons Andy, Ben and Calvin in the ratio 3 : 4 : 5. Now, Mr Wong changes his mind and adjusts the ratio to 4 : 5 : 6. If the share of one of the sons increases by \$50 000, how much is the sum of money?

Solution

4. In the figure, $PQRS$ is a trapezium and $PS : QR = 3 : 2$. X is a point lying on PQ such that $PX : XQ = 3 : 5$. Find the ratio area of $\triangle XQR$: area of quadrilateral $PXRS$.



Solution

6. Drink A is produced by mixing green tea and oolong tea. The costs of green tea and oolong tea are S16/L and S8/L respectively, while the cost of 600 mL of drink A is S6.

(a) Find the ratio of green tea to oolong tea by volume in drink A .

(b) It is known that drink B and drink C are also produced by mixing green tea and oolong tea. The details are as follows:

	<i>Drink B</i>	<i>Drink C</i>
<i>Ratio of green tea to oolong tea by volume</i>	2 : 3	4 : 1

(i) Suppose a drink is produced by mixing x L of drink B and y L of drink C . Express the ratio of green tea to oolong tea by volume in the drink produced in terms of x and y .

Explain (ii) Using the results of (a) and (b)(i), determine if drink A can be produced by mixing drink B and drink C . Explain your answer.

Solution

5. The bathtub in Chan's family has a hot water tap and a cold water tap. Below shows how Mrs Chan filled up the empty bathtub on Monday and Tuesday.

Monday: First, only turned on the hot water tap for 13 minutes. Then, only turned on the cold water tap for 8 minutes.

Tuesday: Only turned on the hot water tap for 25 minutes.

Suppose Mrs Chan tries to fill up the empty bathtub by turning on both taps at the same time on Wednesday. Find the time needed.

Solution