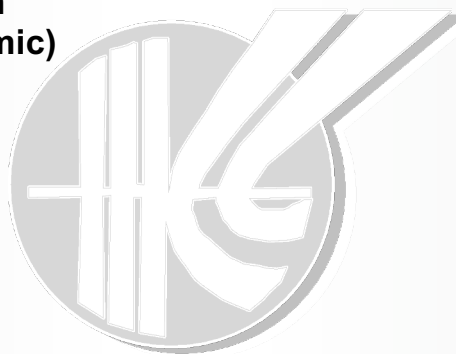


FR2

Name: _____ () Class: _____

KRANJI SECONDARY SCHOOL
Preliminary Examination
Secondary 4 Normal (Academic)**MATHEMATICS**
PAPER 1**4045/01**

Wednesday

28 July 2021

2 hours

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READ THESE INSTRUCTIONS FIRST

Write your class, index number and name in the spaces on top of this page.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

Answer **all** questions.

The number of marks is given in brackets [] at the end of each question or part question.

If working is needed for any question it must be shown with the answer.

Omission of essential working will result in loss of marks.

The total of the marks for this paper is 80.

The use of an approved scientific calculator is expected, where appropriate.

If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give your answers in degrees to one decimal place.

For π , use either your calculator value or 3.142.**For Examiner's Use****Total****80****Setter : Mrs Lee Siew Ling****This question paper consists of 20 printed pages, including the cover page.****[Turn over**

Mathematical Formulae*Compound Interest*

$$\text{Total amount} = P \left(1 + \frac{r}{100} \right)^n$$

Mensuration

$$\text{Curved surface area of a cone} = \pi r l$$

$$\text{Surface area of a sphere} = 4\pi r^2$$

$$\text{Volume of a cone} = \frac{1}{3} \pi r^2 h$$

$$\text{Volume of a sphere} = \frac{4}{3} \pi r^3$$

$$\text{Area of triangle } ABC = \frac{1}{2} ab \sin C$$

$$\text{Arc length} = r\theta, \text{ where } \theta \text{ is in radians}$$

$$\text{Sector area} = \frac{1}{2} r^2 \theta, \text{ where } \theta \text{ is in radians}$$

Trigonometry

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

Statistics

$$\text{Mean} = \frac{\sum fx}{\sum f}$$

$$\text{Standard deviation} = \sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f} \right)^2}$$

- 1 By writing each number correct to 1 significant figure, estimate the value of

$$\sqrt{\frac{4.26 \times 8.53}{97.1}}.$$

Answer [2]

- 2 Find the smallest prime number x satisfying $2x + 3 > 10$.

Answer $x =$ [2]

- 3 The line $3x + 2y = 8$ crosses the y -axis at the point A .
Find

(a) the coordinates of the point A ,

Answer (.....,) [1]

(b) the gradient of the line.

Answer [1]

- 4 A sum of money was divided among Andy, Ben and Charles in the ratio 3 : 4 : 5. If the sum of money had been divided equally among the 3 boys, Andy would have received an extra \$30. Find the sum of money.

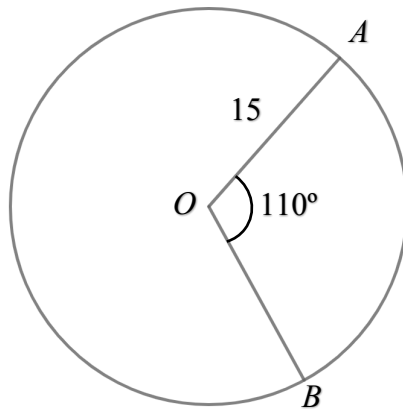
Answer \$..... [2]

- 5 Simplify $\frac{35pr}{12p} \div \frac{5r^4}{6p^3q^2}$. Give your answer as a single fraction in its simplest form.

Answer [2]

(Sec 4 Topic)

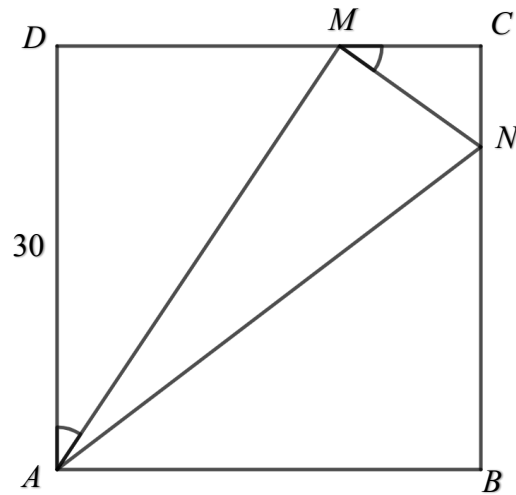
- 6 The diagram shows a circle, centre O and radius 15 cm. A and B are points on the circumference and angle $AOB = 110^\circ$.



Find the perimeter of the major sector. Leave your answer in the simplest form in terms of π .

Answer cm [2]

- 7 In the diagram, $ABCD$ is a square of sides 30 cm. The ratio of the length of CM to MD is 1 : 2 and angle $MAD = \text{angle } CMN$.



- (a) Find the exact value of $\tan \angle MAD$.

Answer [1]

- (b) Hence or otherwise, find the length of CN .

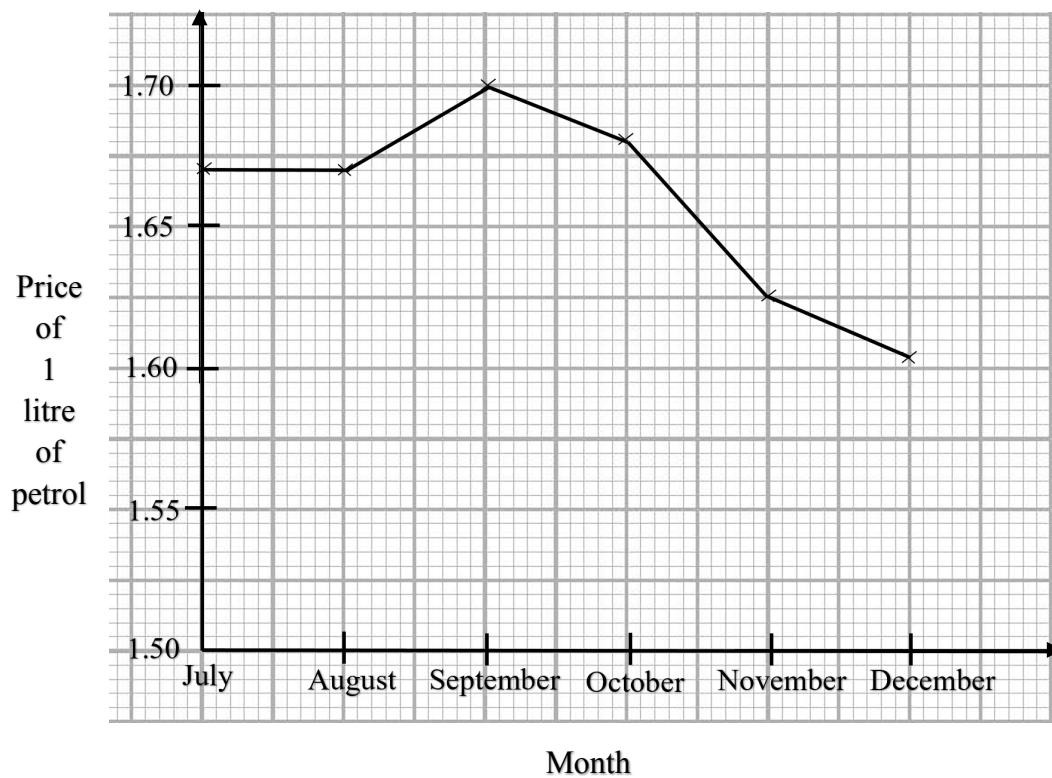
Answercm [2]

- 8 Write these numbers in order, starting with the smallest.

-3 3.03 $-\frac{13}{3}$ $3\frac{1}{3}$

Answer [1]
smallest

- 9 The line graph shows the prices of petrol in the last 6 months of 2018.



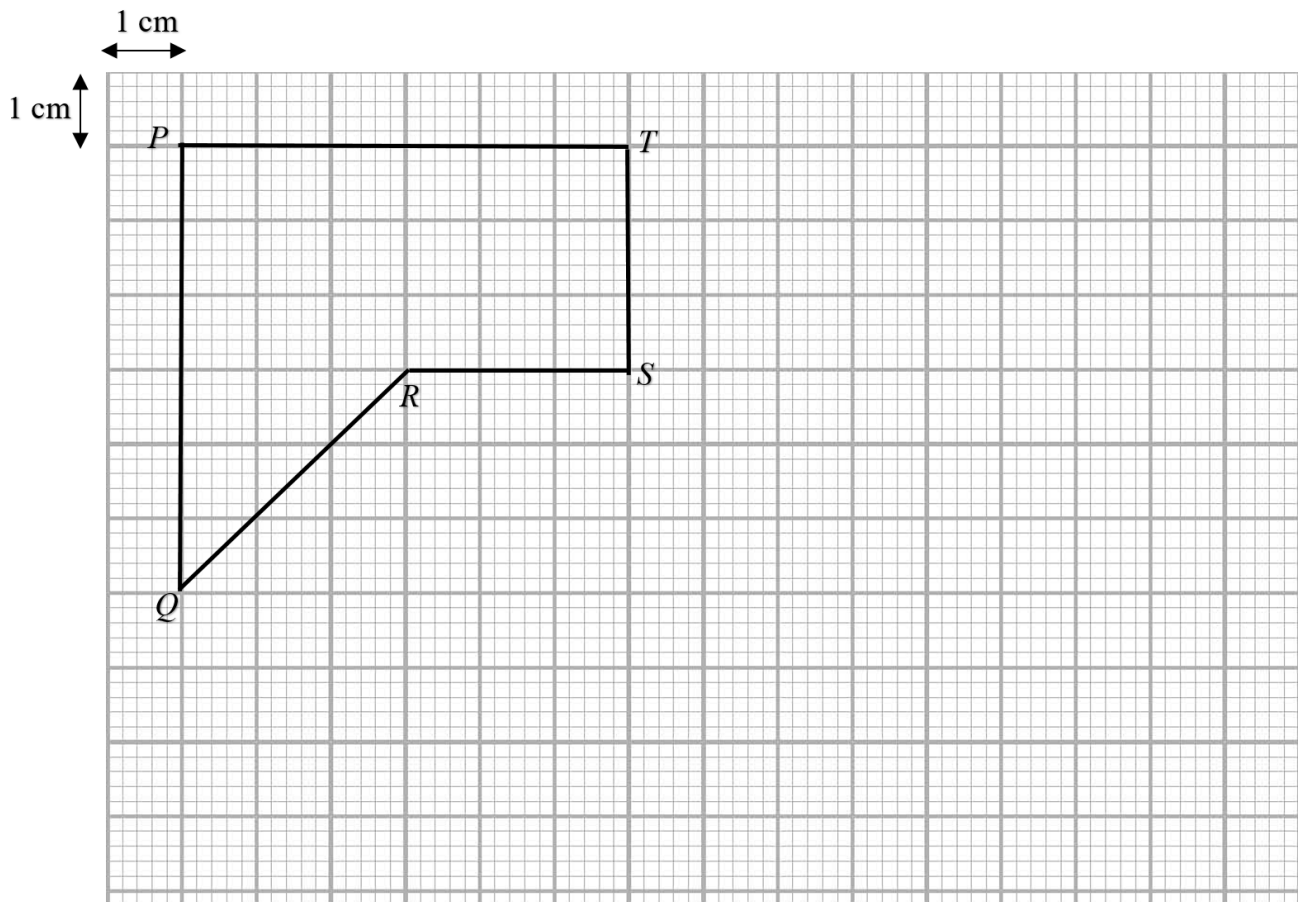
- (a) Between which two months did the price of petrol have the greatest decrease?

Answer and [1]

- (b) Find the percentage increase in the price of the petrol from August to September.

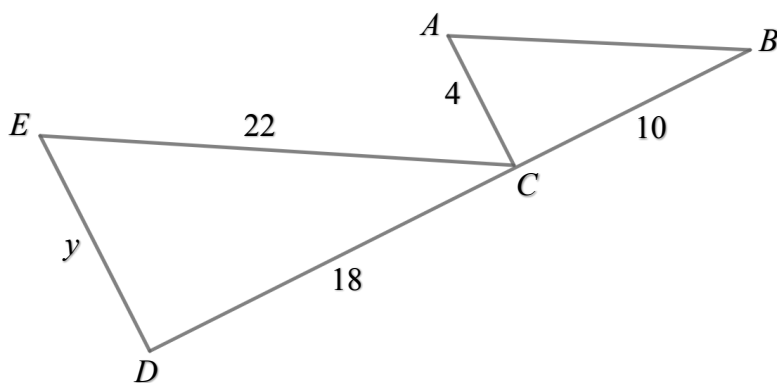
Answer% [2]

- 10 (a) On the grid below, draw a reduction of figure $PQRST$ using a scale factor of $\frac{2}{3}$.



[1]

- (b) ABC and ECD are similar triangles with all the lengths given in centimetres.



- (i) $\triangle ECD$ is an enlargement of $\triangle ABC$. Find the scale factor.

Answer [1]

(ii) Find y .

Answer $y = \dots\dots\dots\text{cm}$ [1]

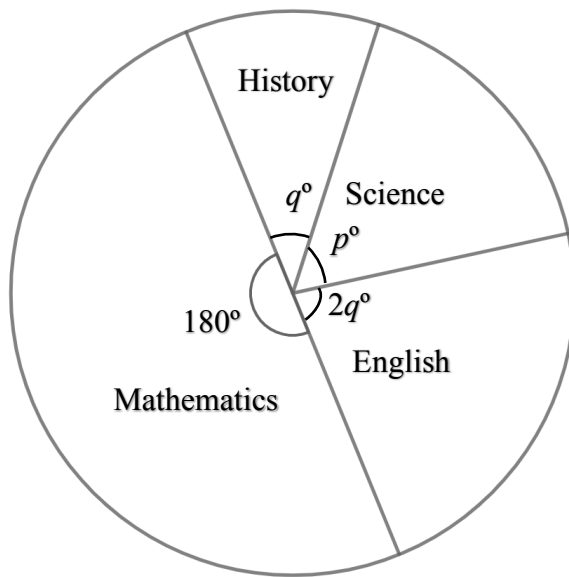
11 (a) Simplify $4y - 10x - 3y + 6x$.

Answer $\dots\dots\dots$ [1]

(b) Simplify $\frac{2x-5}{2} - \frac{3x}{5}$.

Answer $\dots\dots\dots$ [2]

- 12** A number of students were asked to name their favourite subject. The results of the survey is shown in the pie chart. One sixth of the students chose Science. 45 students chose Mathematics.



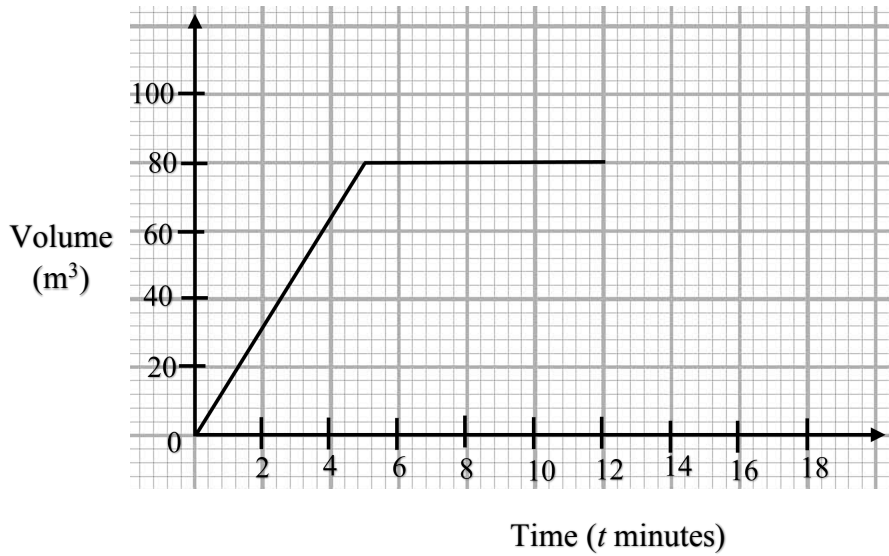
- (a)** How many students chose Science?

Answer [1]

- (b)** How many students chose English?

Answer [2]

13



The graph shows the volume of a gas in a gas chamber over a period of time.

(a) Use the graph to find

(i) the volume of the gas in the gas chamber when $t = 4$,

Answer (a) (i)m³ [1]

(ii) the value of t when there are 40 m³ of the gas in the chamber.

Answer (a) (ii) $t =$ min [1]

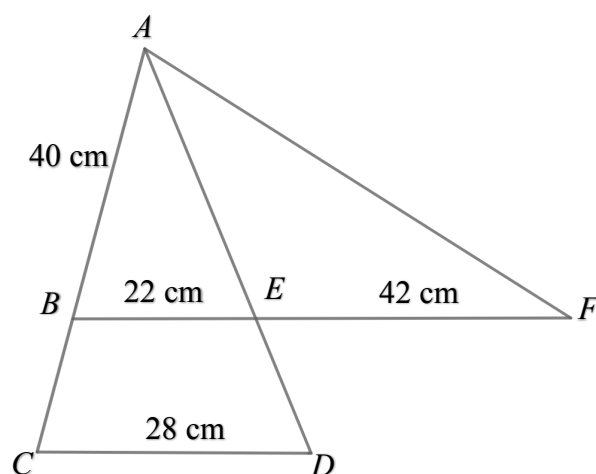
(b) At $t = 12$, the gas chamber starts to empty at a constant rate of 20 m³/ minute.
Complete the graph.

[1]

- 14** Max cycles at 20 km/ h for 39 minutes from Pioneer to Holland Village.
He then cycles a further 7.5 km in 0.5 hour from Holland Village to Clarke Quay.
Calculate his average speed, in km/h for the whole journey from Pioneer to Clarke Quay.

Answerkm/h [3]

- 15** Triangle ACD is similar to triangle FBA .



- (a)** Write down the angle in triangle ACD that is of the same size as angle ABF .

Answer [1]

- (b)** Find the length of BC .

Answer cm [2]

- 16 (a)** Write 324 as a product of its prime factors.

Answer [1]

(b)

$$360 = 2^3 \times 3^2 \times 5$$

$$3150 = 2 \times 3^2 \times 5^2 \times 7$$

- (i)** Write down the LCM (lowest common multiple) of 324, 360 and 3150 in index notation.

Answer [1]

- (ii)** What is the greatest number that will divide 360, 324 and 3150 exactly?

Answer [1]

- 17** In December 2019, the rate of exchange between Singapore dollars (\$) and Australian dollars (AUD\$) was \$1 = AUD\$1.054.

Kelly bought a handbag during her holiday in Australia. The handbag cost AUD\$189.

- (a)** What was the value of the handbag in Singapore dollars?

Answer \$..... [2]

- (b) Joe saw a watch priced at \$255 when he was on holiday in Singapore. The shop would charge 2.05% commission if he paid in Australian dollars. The same watch cost AUD\$280 in Australia. Should Joe buy the watch in Singapore or in Australia? Show working to justify your answer.

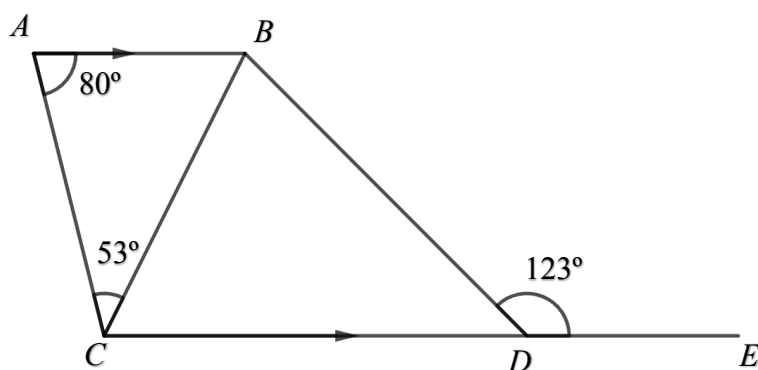
Answer

[3]

- 18 Solve $e - 2 = \frac{8}{e + 3}$, giving your answer correct to 2 decimal places. Show your working.

Answer $e = \dots\dots\dots$ or $e = \dots\dots\dots$ [4]

- 19** In the diagram, AB is parallel to CE . Angle $BAC = 80^\circ$, angle $ACB = 53^\circ$ and angle $BDE = 123^\circ$.



- (a)** Find angle ACE , giving a reason for your answer.

Answer Angle $ACE = \dots\dots\dots$ because $\dots\dots\dots$
 $\dots\dots\dots$ [2]

- (b)** Calculate angle CBD .

Answer $\dots\dots\dots^\circ$ [2]

(Sec 4 Topic)

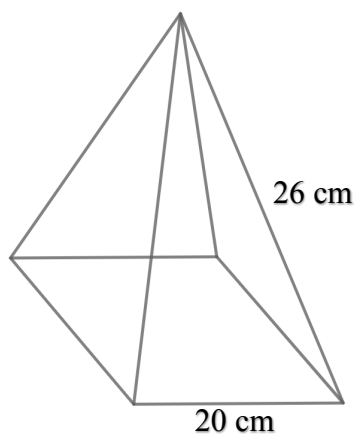
- 20** The probability that a train arrives early at a station is 0.3. The probability that it arrives on time is 0.52. Find the probability that the train is late.

Answer $\dots\dots\dots$ [2]

- 21** Kim pays the admission price of \$28 to get into a theme park. Mabel has a voucher that allows her to go into the same theme park at $p\%$ of the admission price. Mabel pays \$22.40. Calculate p .

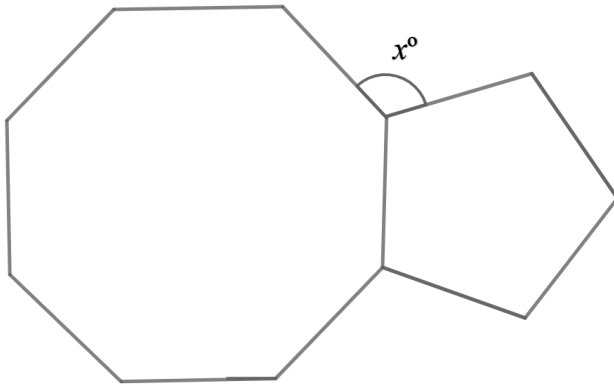
Answer $p = \dots\dots\dots\%$ [2]

- 22** A solid pyramid has a square base of sides 20 cm and 4 congruent isosceles triangles of sides 26 cm. Calculate its volume.



Answer $\dots\dots\dots\text{cm}^3$ [4]

23



The diagram shows a sketch of a regular pentagon and a regular octagon.
Calculate x .

Answer $x = \dots\dots\dots^\circ$ [4]

24 A bakery sells pies at \$ x each and pizzas at \$ y each.

(a) One day, the bakery sold 25 pies and 15 pizzas. These sales totalled \$680.
Show that $5x + 3y = 136$.

Answer

- (b)** The following day, the bakery sold 16 pies and 18 pizzas. These sales totalled \$536.
Show that $8x + 9y = 268$.

Answer

[1]

- (c)** Solve the simultaneous equations

$$5x + 3y = 136$$

$$8x + 9y = 268.$$

Answer $x = \dots\dots\dots$

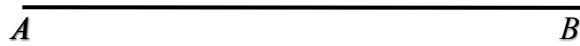
$y = \dots\dots\dots$ [3]

- (d)** Calculate the difference in price between a pie and a pizza.

Answer \$..... [1]

- 25 (a) Construct triangle ABC where $AC = 10$ cm and angle $BAC = 40^\circ$.
 AB has already been drawn.

[2]



- (b) Construct the perpendicular bisector of AB . [1]
(c) Construct the angle bisector of angle ABC . [1]
(d) Given that the two bisectors meet at P . measure PA . [1]

Answer $PA = \dots\dots\dots$ cm [1]

- 26** Water flows at an average speed of 300 cm/s through a cylindrical pipe of radius 5 cm. Two such pipes are connected to a tank to drain the water in the tank. If water enters the tank at a rate of 60 000 cm³/s, would the two pipes be able to drain the water as quickly as it enters the tank? Show working to justify your answer.

Answer

[3]