

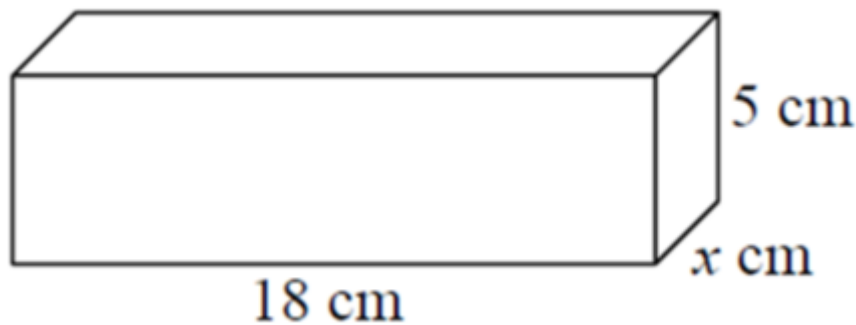
LIVE: PAPER 2 EXAM QUESTIONS**03 NOVEMBER 2014****Lesson Description**

In this lesson we:

- Revise key concepts that will be examined in Paper Two
- Such concepts include:
 - Analytical Geometry
 - Trigonometry
 - Data Handling

**Challenge Question**

The base of the rectangular prism below has a length 18cm, a breadth x cm. The height of the prism is 5cm.



Calculate the following in terms of x :

- The volume of the prism.
- The new breadth of the prism, if the volume of the prism is doubled, but the length and height remain the same.

**Summary****Paper Two**

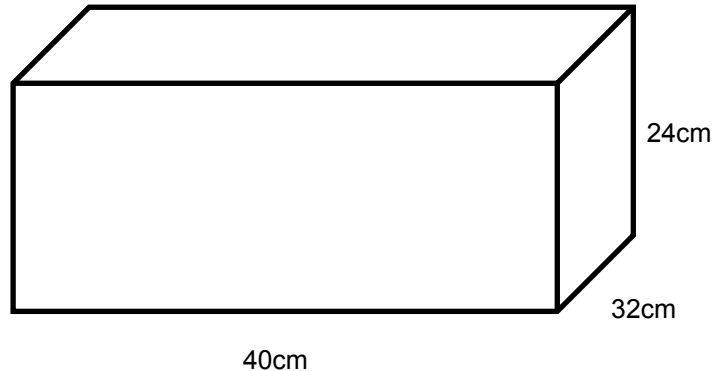
- Analytical Geometry
- Measurement
- Trigonometry
- Data Handling



Test Yourself

Question 1

A cardboard box with dimensions 40cm, 32cm and 24 cm is shown below.



A jam tin has a diameter of 8cm and a height of 12cm. The maximum number of jam tins that can be placed in the cardboard box is:

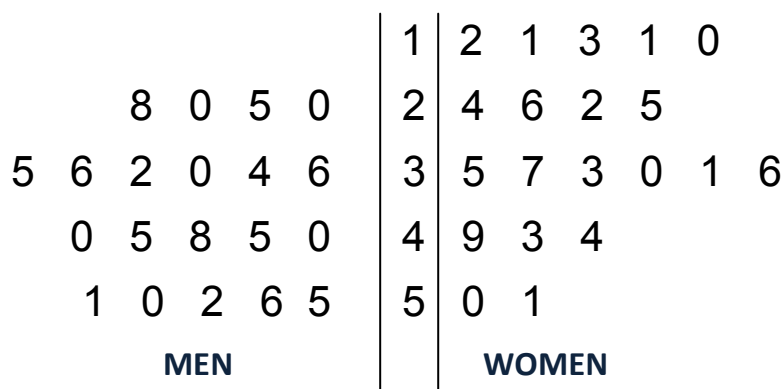
- A. 18 tins
- B. 20 tins
- C. 40 tins
- D. 46 tins

Question 2

A square and an equilateral triangle have equal perimeters. Each side of the triangle is 3 cm longer than each side of the square. How long is each side of the square?

- A. 3cm
B. 6cm
C. 9cm
D. 12cm

Question 3



In a survey to determine the (bad) smoking habits of first-year students, the number of cigarettes that they smoked each day was counted. The back-to-back stem and leaf plot above shows the data collected.



Which of the following statements is/are correct?

1. 20 students were questioned in the survey?
 2. No man smoked less than 20 cigarettes each day?
 3. The total number of cigarettes smoked each day by the women was less than the total smoked each day by the men.
- A. Only 1
B. Only 2
C. Only 1 and 3
D. Only 2 and 3

Question 4

A triangle ABC has vertices

$$A(1; 3), B(1; -2) \text{ and } C(-4; -2)$$

Which of the following is/are true?

1. distance of BC = $\sqrt{41}$
 2. $\hat{C} = 90^\circ$
 3. The midpoint of the hypotenuse is $(-\frac{3}{2}; \frac{1}{2})$
- A. Only 1
B. Only 2
C. Only 2 and 3
D. Only 3

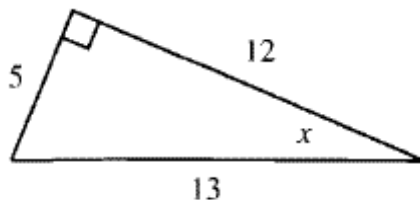
Question 5

The equation of the line through the point (3;3) and perpendicular to the line $2y + 3x = 0$ is

- A. $y = \frac{2}{3}x + 1$
B. $y = -\frac{3}{2}x + 5$
C. $y = -\frac{3}{2}x + 1$
D. $y = \frac{3}{2}x + 1$

Question 6

Find $\cos x$ for the angle x in the figure



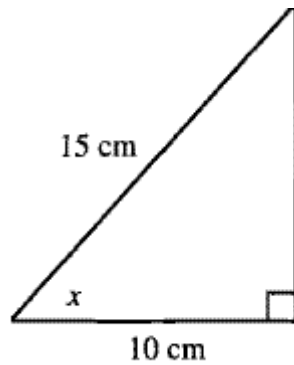
- A. $\frac{5}{13}$
B. $\frac{5}{12}$



- C. $\frac{12}{13}$
D. $\frac{13}{12}$

Question 7

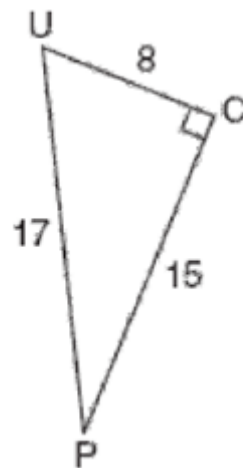
Find $\tan x$ for angle x in the figure



- A. $\frac{\sqrt{5}}{2}$
B. $\frac{\sqrt{5}}{3}$
C. $\frac{2}{3}$
D. $\frac{\sqrt{13}}{2}$

Question 8

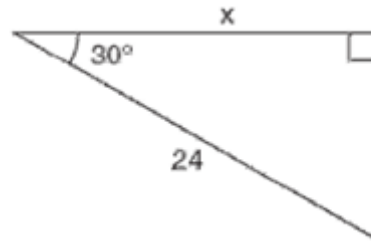
In the diagram below show right triangle UPC. Which ratio represents $\sin \hat{U}$



- A. $\frac{15}{8}$
B. $\frac{15}{17}$
C. $\frac{8}{15}$
D. $\frac{8}{17}$

Question 9

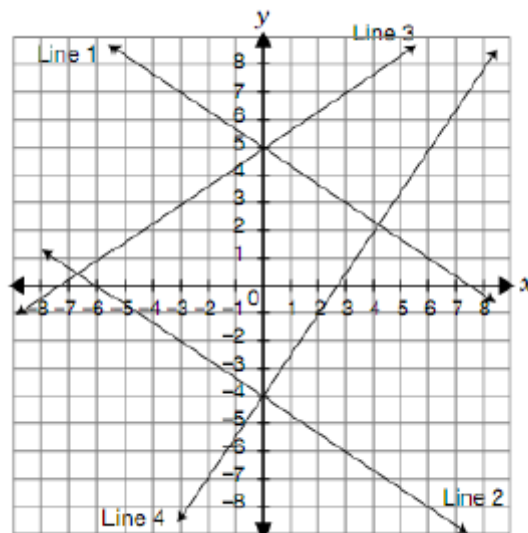
In the right triangle shown in the diagram below, what is the value of x to the nearest whole number?



- A. 28
- B. 21
- C. 12
- D. 14

Question 10

The grid below show the graphs of four linear functions



Which of the following equations matches the line with its equation:

- A Line 1: $y = -\frac{3}{2}x + 5$
- B Line 2: $2x + 3y + 12 = 0$
- C Line 3: $y = \frac{3}{2}x + 5$
- D Line 4: $2x - 3y - 12 = 0$



Improve your Skills

Question 1

Given the points $A(-3; 2)$, $B(5; -1)$ and $C(2; p)$, calculate:

- The length of the line segment AB.
- The co-ordinates of M, the midpoint of the line segment AB.
- The value of p if the gradient of BC is 2.

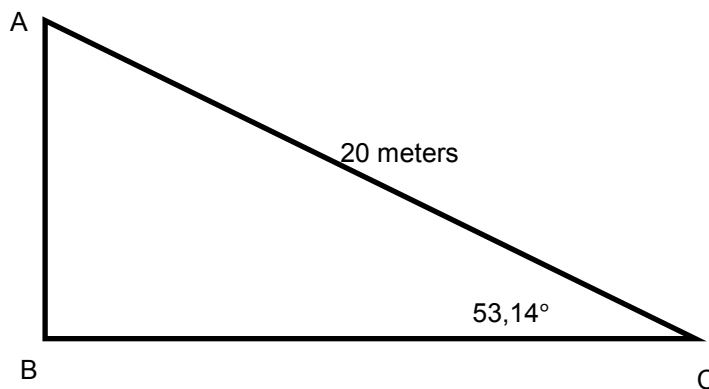
Question 2

ΔABC has co-ordinates $A(-4; 2)$, $B(1; 2)$ and $C(-1; 6)$ and $AC = 5$ units.

If D is the point $(x; y)$ such that $E(2\frac{1}{4}; 7)$ is the midpoint of CD. Determine the coordinates of D.

Question 3

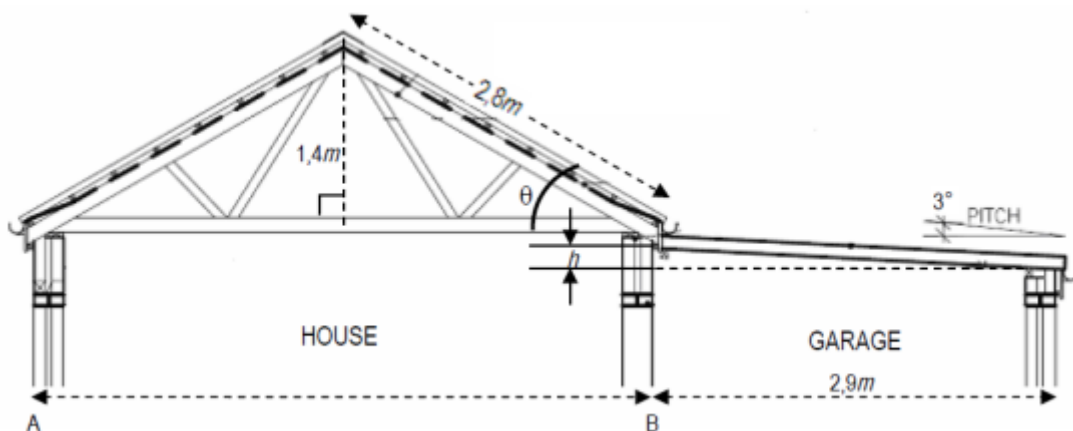
In ΔABC below, $\hat{C} = 53,14^\circ$ and $AC = 20$ meters



- Calculate the value of AB
- Hence, express BC in terms of $\tan 53,14^\circ$

Question 4

The diagram below is a rough, un-scaled plan of the front structure of a house and garage.



- Calculate the value of h .
- Calculate the pitch of the house roof (shown as θ)



- c) Calculate the width of the house (shown as AB)
- d) What would be the impact on h if the pitch of the garage roof was changed to be 15.

Question 5

The ages of the people in the Jackson family are as follows:

63 ; 32 ; 34 ; 64 ; 32 ; 27 ; 35

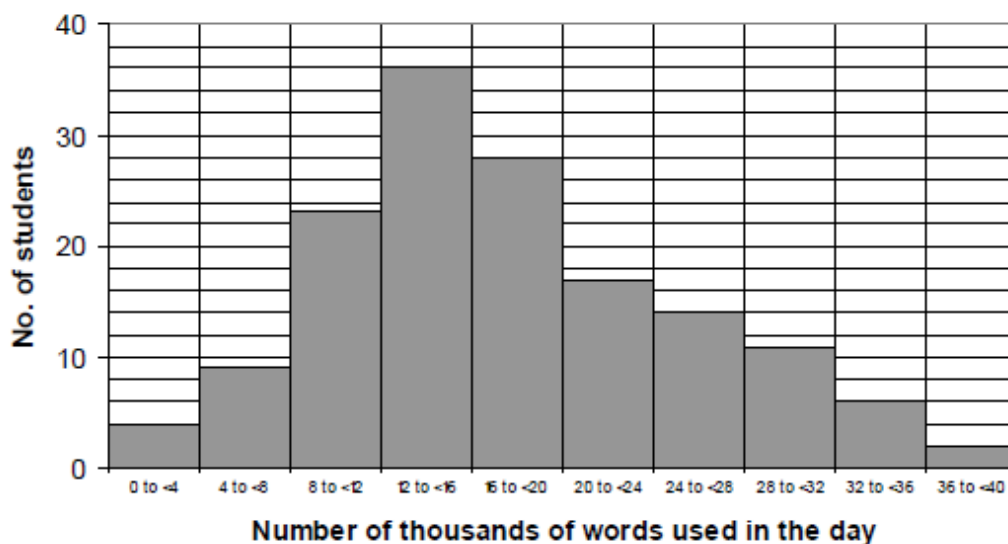
- a) Determine the mean
- b) Determine the mode
- c) Determine the median
- d) Determine the upper quartile.

Question 6

How much do people talk on skype in a day?

Below is a histogram showing results in a sample group of 150 university students and the number of words spoken by each on skype on a particular day.

Skype usage in a sample of 150 university students



- a) What is the range?
- b) What is the modal group?
- c) Which group contains the median value?
- d) Calculate the estimated mean?



Answers

Challenge Question

$$V = 18 \times 5 \times x \quad \checkmark$$

$$= 90x \text{ cm}^3 \quad \checkmark$$

$$\text{New } V = 2 \times (18 \times 5) \times x$$

$$\therefore \text{new breadth} = 2x \quad \checkmark$$

Test Yourself

1. C
2. C
3. D
4. D
5. A
6. C
7. A
8. B
9. B
10. B

Improve your Skills

Question 1

$$\begin{aligned} AB &= \sqrt{(-3-5)^2 + (2-(-1))^2} \\ &= \sqrt{73} \quad \checkmark \checkmark \\ &= 8,54 \text{ units} \end{aligned}$$

$$\begin{aligned} M &= \left(\frac{-3+5}{2}, \frac{2-1}{2} \right) \quad \checkmark \\ &= \left(1; \frac{1}{2} \right) \quad \checkmark \end{aligned}$$

$$\text{If } m_{BC} = 2$$

$$\begin{aligned} m_{BC} &= \frac{p-(-1)}{2-5} = 2 \quad \checkmark \checkmark \\ p+1 &= -6 \\ p &= -7 \quad \checkmark \end{aligned}$$



Question 2

$$E = \left(\frac{x-1}{2}; \frac{y+6}{2} \right) = (2\frac{1}{4}; 7)$$

$$\therefore \frac{x-1}{2} = \frac{9}{4} \quad \text{and} \quad \frac{y+6}{2} = 7 \quad \checkmark$$

$$x-1 = \frac{9}{2} \quad y+6 = 14$$

$$x = \frac{11}{2} \text{ (or } 5\frac{1}{2}) \quad y = 8$$

$$\therefore D = (5\frac{1}{2}; 8) \quad \checkmark \quad \checkmark$$

Question 3

$$\sin 53,14^\circ = \frac{AB}{20} \quad \checkmark$$

$$\therefore AB = 20 \times \sin 53,14^\circ \\ = 16 \text{ m} \quad \checkmark$$

$$\tan 53,14^\circ = \frac{AB}{BC} \quad \checkmark$$

$$\therefore BC = \frac{AB}{\tan 53,14^\circ} = \frac{16}{\tan 53,14^\circ} \quad \checkmark$$

Question 4

$$\tan 3^\circ = \frac{h}{2,9} \quad \checkmark \quad \checkmark$$

$$\therefore h = 2,9 \times \tan 3^\circ \quad \checkmark$$

$$\therefore h = 0,15 \text{ m} \quad \checkmark$$

$$\sin \theta = \frac{1,4}{2,8} \quad \checkmark \quad \checkmark$$

$$\theta = 30^\circ \quad \checkmark \quad \checkmark$$

$$\text{Third side} = \sqrt{2,8^2 - 1,4^2} \text{ (pythag)} \quad \checkmark \\ = 2,43 \text{ m} \quad \checkmark$$

The roof is symmetrical $\therefore$

$$\text{width} = 2 \times 2,43$$

width of house is 4,86m $\checkmark$

$$\tan 15^\circ = \frac{h}{2,9} \quad \checkmark$$

$$\therefore h = 2,9 \times \tan 15^\circ$$

$$\therefore h = 0,78 \text{ m} \quad \checkmark$$

Impact: $0,78 \text{ m} \div 0,15 \text{ m} = 5,18 \quad \checkmark \quad \checkmark$

h becomes about 5,2 times larger.



Question 5

$$\text{Mean} = \frac{63+32+34+64+32+27+35}{7} \quad \checkmark$$

$$= 41 \quad \checkmark$$

Mode = 32 $\checkmark$ (it occurs most often)

Ages in order: 27; 32; 32; 34; 35; 63; 64 $\checkmark$

Median = 34 $\checkmark$

63 $\checkmark \checkmark$

Question 6

40 000 words $\checkmark$

The 4th group (12000 to 16000 words) is the modal group as it has the highest frequency.

$\checkmark$

150 data values

$\therefore$ median is the 75,5th value $\checkmark$

$$4+9+23+36 = 72$$

This lies in the 5th class $\checkmark$

Estimated mean

$$= (4 \times 2\,000 + 9 \times 6\,000 + 23 \times 10\,000 + 36 \times 14\,000 + 28 \times 18\,000 + 17 \times 22\,000 + 14 \times 26\,000 + 11 \times 30\,000 + 6 \times 34\,000 + 2 \times 38\,000) \div 150$$

$\checkmark \checkmark \checkmark$

$$= 2\,648\,000 \div 150 \quad \checkmark$$

$$= 1\,7653 \text{ words} \quad \checkmark$$