## Section A: Short Questions (70 marks)

**Show your steps clearly.**

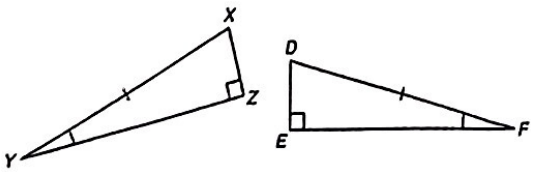
1. Factorize the following expressions.

   a. $5b^2 - 15ab^3$ . (1 mark)

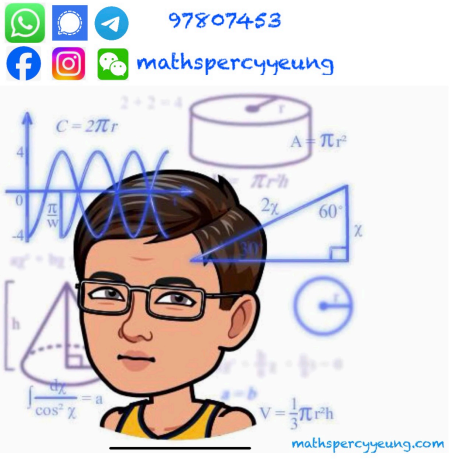
   b. $x^2 + ax + bx + ab$ . (3 marks)

2. It is given that $x$ and $y$ are in inverse proportion. When $x = 12$, $y = 50$. Find the value of $x$ when $y = 100$. (3 marks)

3. In the figure, prove that $\Delta XYZ \cong \Delta DFE$. (3 marks)





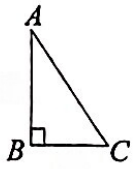
4. The profit $\$P$ made by Shop $A$ can be calculated by the formula: $P = 250n - 1000$, where $n$ is the number of customers.

   a. Find the profit when there are 24 customers. (2 marks)

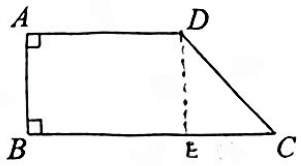
   b. Make $n$ be the subject. (2 marks)

   c. If Shop $A$ makes a profit of \$8 500, find the number of customers. (2 marks)

5. The figure shows a right-angled $\triangle ABC$. It is given that $AB = 44$ cm and $BC = 33$ cm. Find $AC$. (3 marks)



6. In the figure, given that $AD = 9$ cm, $CD = 20$ cm and $BC = 25$ cm. Find the perimeter of trapezium $ABCD$. (5 marks)




7. In $\triangle ABC$, given that $AB = 58$, $BC = 40$ and $AC = 42$. Determine whether $\triangle ABC$ is a right-angled triangle. If yes, state which angle is a right angle. (4 marks)

8. Determine whether $(-10, 5)$ lies on the graph of the equation $3y + 5 = -2x$. (3 marks)

9. Mary measures the length of a pen to be $x$ cm (cor. to the nearest $y$ cm). It is given that the upper limit and the percentage error of the measurement are 12.75 cm and 2% respectively. Find the measured length with the degree of accuracy. (4 marks)

10. If $\frac{2x+y}{x+4y} = \frac{2}{3}$, find $x : y$. (3 marks)



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11. Simplify $\frac{x+3}{2x-6} + \frac{x}{3-x}$ . (4 marks)

12. Make $w$ be the subject of the formula $x = \frac{1+w}{1-w}$ . (4 marks)

13. John rides a bicycle along a straight road from city $A$ to city $B$ at a constant speed of 15 km/h. The distance between the two cities is measured to be 15 cm on a map. If John uses 2 hours to complete the journey, find the scale of the map in the form $1 : n$. (4 marks)

14. The speed of train $A$ and train $B$ are 180 km/h and 45 m/s respectively.
    a. Which train has a higher speed? (5 marks)
    b. Hence, find the time taken (in minutes) for the higher speed train to complete a journey of 225 km. (3 marks)


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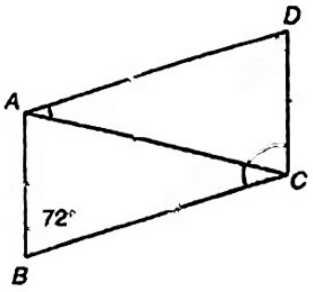
15. In the figure, $AB = CD$, $BC = AD$, $\angle ABC = 72^\circ$ and $\angle ACB = 31^\circ$.

a. Prove that $\Delta ABC \cong \Delta CDA$. (3 marks)

b. Find $\angle ACD$. (4 marks)



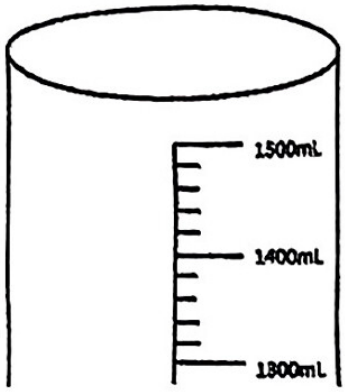

16. If $(m, n)$ is the solution of the following simultaneous equations $\begin{cases} ax + by + 1 = 0 \\ cx + dy - 3 = 0 \end{cases}$,

where $a$, $b$, $c$ and $d$ are constants. Hugo claims that the value of $am + bn + cm + dn$ always be negative. Do you agree? Explain your answer. (5 marks)

**Section B: Long Questions (30 marks)**

**Show your steps clearly.**

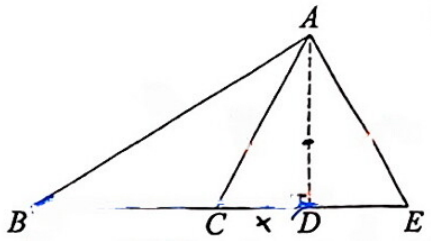
17. The volume of orange juice in a jar is measured as 1.36 L by the following measuring cylinder.




a. Find the maximum absolute error. (2 marks)

b. Matthew pours the orange juice from the jar into $n$ cups such that the volume of orange juice in each cup is measured as 130 mL (corr. to the nearest 10 mL). Find the greatest possible value of $n$. (7 marks)

19. In the figure, $BCDE$ is a straight line, $AC = AE$ and $AD$ is perpendicular to $BE$.




a. Show that $CD = DE$. (4 marks)

b. Given that $DE = x$, $AB = 12$, $AC = 10$ and $BE = 16$.

i. Find $AD^2$ in terms of $x$. (2 marks)

ii. Find the value of $x$. (4 marks)

iii. Find $BC$. (1 mark)

18. Last year, the ratio of Amy's weight to Betty's weight was 5 : 3 This year, Amy's weight reduced by 10 kg and Betty's weight remained unchanged. The new ratio of their weight becomes 40 : 27.

a. Find Betty's present weight. (5 marks)

b. Amy and Betty plan to join a '2 people bungy jumping together' in Macau next week. One of the regulations states that 'total weight of 2 people should be between 80 kg and 135 kg'. Can they fulfill this requirement? Explain your answer. (5 marks)

1. Factorize $30m^2 - 6m$.

A. $24m^2$

B. $6m(5m - 6)$

C. $6(5m - 1)$

D. $6m(5m - 1)$

2. Factorize $6x^2(y - 2) + 9x(2 - y)$.

A. $(2 - y)(6x^2 + 9x)$

B. $(y - 2)(6x^2 - 9x)$

C. $3x(2x - 3)(y - 2)$

D. $3x(2x - 3)(2 - y)$

3. Factorize $ac - bc - c^2 + ab$.

A. $(a + c)(b + c)$

B. $(a + c)(c - b)$

C. $(a - c)(b + c)$

D. $(a - c)(c - b)$

4. Simplify $2k + \frac{1}{3k}$.

A. $\frac{2}{3}$

B. $\frac{2k + 1}{3k}$

C. $\frac{2k^2 + 1}{3k}$

D. $\frac{6k^2 + 1}{3k}$

5. Make $q$ the subject of the formula $\frac{5p}{3+q} = 2$.

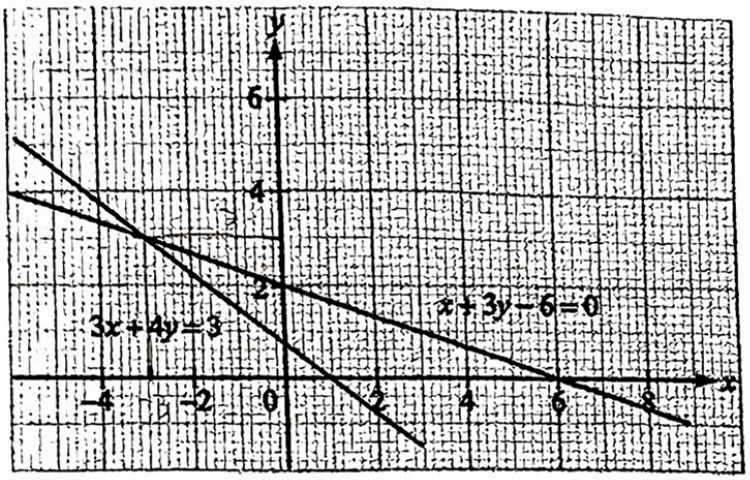
A. $q = 5p - 6$

B. $q = \frac{5p-3}{2}$

C. $q = \frac{5p}{2} - 3$

D. $q = \frac{5p}{2} - 6$

6. Solve the simultaneous equation $\begin{cases} x + 3y - 6 = 0 \\ 3x + 4y = 3 \end{cases}$ graphically.




A. The approximate solution is $(-3, 3)$.

B. The approximate solution is $(3, -3)$.

C. The exact solution is $(-3, 3)$.

D. The exact solution is $(3, -3)$.

7. If $3m + 4n + 5 = m + n = -2$, then $n =$

A. $-1$.

B. 1.

C. $-3$.

D. 3.

8. The number of \$2 coins and \$5 coins in a cash box are $x$ and $y$ respectiviely. The total amount of the coins is \$300 . It is given that the number of \$2 coins is 15 more than the twice that of \$5 coins . Which of the following pairs of simultaneous equations shows the relations between $x$ and $y$?

A. $\begin{cases} x + y = 300 \\ x = 15 + 2y \end{cases}$

B. $\begin{cases} x + y = 300 \\ 2y = 15 + x \end{cases}$

C. $\begin{cases} 2x + 5y = 300 \\ x = 15 + 2y \end{cases}$

D. $\begin{cases} 2x + 5y = 300 \\ 2y = 15 + x \end{cases}$

9 Given that simultaneous equation $\begin{cases} 3y = 2x - k \\ 3x + 2y - 8k = 0 \end{cases}$, where $k$ is a non-zero number.

Express $x$ in terms of $k$.

A. $-k$

B. $k$

C. $2k$

D. $\frac{17}{5}k$

10. The lower limit of the actual length of a playground is 77.5 m (correct to the nearest 5 m). What is the maximum absolute error of the measurement?

A. 2.5 m

B. 5.0 m

C. 80.0 m

D. 82.5 m

11. The length of a string is measured to be 200 cm, the maximum absolute error is 10 cm. What is the least possible length of the string?

A. 5 cm

B. 190 cm

C. 195 cm

D. 205 cm

12. The weight of a bottle is 249 g (correct to the nearest g). Which of the following could be its actual weight?

I. 249.0 g
II. 248.5 g
III. 249.5 g

A. I and II only
B. I and III only
C. II and III only
D. All of the above

13. The following table shows the measured values and the corresponding maximum absolute error of four measurements $W, X, Y$ and $Z$.

| Measurement | $W$ | $X$ | $Y$ | $Z$ |
|---|---|---|---|---|
| Measured value | 5050 g | 7500 g | 450 kg | 76.0 kg |
| Degree of accuracy | Correct to the nearest 50 g | Correct to the nearest 50 g | Correct to the nearest 5 kg | Correct to the nearest 0.5 kg |

Which measurement is the most accurate?

A. Measurement $W$
B. Measurement $X$
C. Measurement $Y$
D. Measurement $Z$

14. Determine whether a rate or ratio should be used to relate the quantities in each of the following statements.

(I) Flash types 60 words per hour.

(II) The weight of Judy and Nick are 30 kg and 36 kg respectively.

| | (I) | (II) |
|---|---|---|
| A. | Ratio | Ratio |
| B. | Ratio | Rate |
| C. | Rate | Rate |
| D. | Rate | Ratio |

15. A factory produces 720 pieces of spare parts in 5 minutes. The production rate of the factory is

A. $\frac{1}{8640}$ piece/s.

B. 1 piece/s.

C. $\frac{12}{5}$ pieces/s.

D. 60 pieces/s.

16. At present, Wilson and his father are 12 and 48 years old respectively. Find the ratio of the age of Wilson to the age of his father 4 years later.

A. 21:46
B. 4:13
C. 1:4
D. 1:3

17. If $a:b = 3:7$ , $b:c = 5:4$ , then $a:b:c =$

A. 3:7:4.
B. 9:35:16.
C. 12:28:35.
D. 15:35:28.

18. It is given that $x$ and $y$ are in inverse proportion. Find the percentage change in the value of $x$ when the value of $y$ is decreased from 25 to 10.

A. $-60\%$
B. 40%
C. 150%
D. 250%

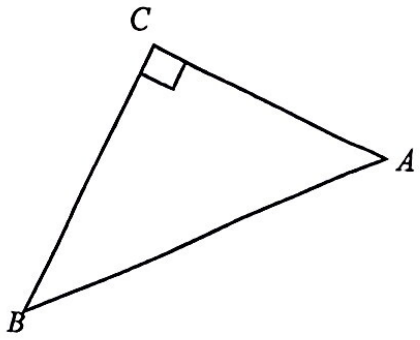
In the figure, which side is the hypotenuse?

A. $AB$

B. $AC$

C. $BC$

D. $A$



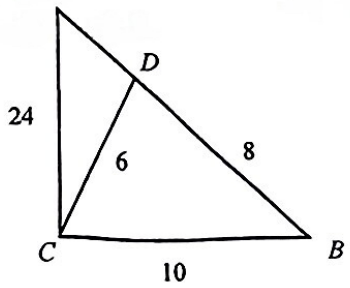

20. In the figure, $ADB$ is a straight line. $AC = 24, BC = 10, BD = 8, CD = 6$. Find $AD$. (Correct to 3 significant figures)

A. 18

B. 23.2

C. 24.7

D. 26



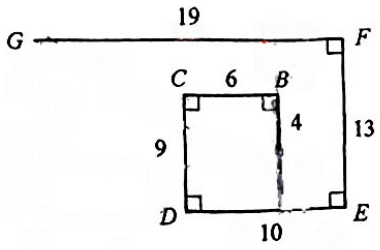

21. In the figure, the length of the line segment joining $A$ and $G$ is

A. 15 units

B. 17 units

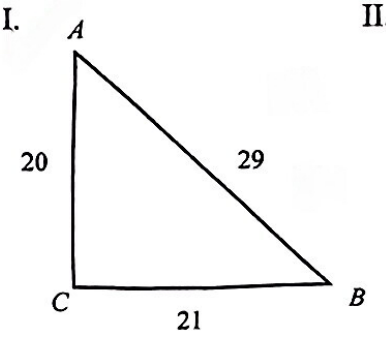
C. 18 units

D. 23 units

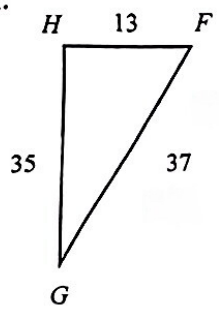


22. Which of the following are the right-angled triangles ?

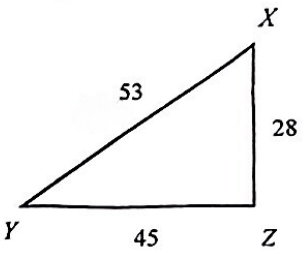
I.




II.




III.



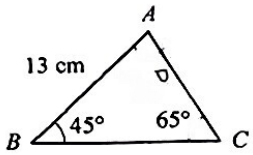

A I and II only

B, I and III only

C. II and III only

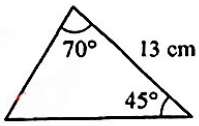
D. I, II and III

23. The figure shows a triangle.

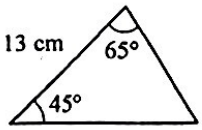



Which of the following triangles is congruent to $\Delta ABC$ as shown in the above figure?

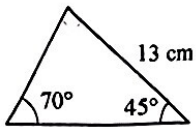
A



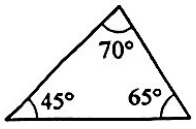

B.



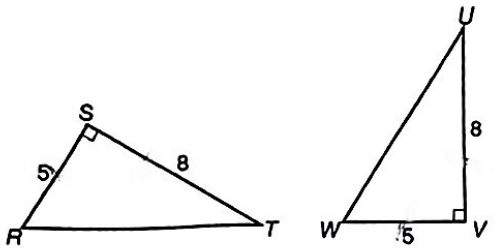

C.




D.

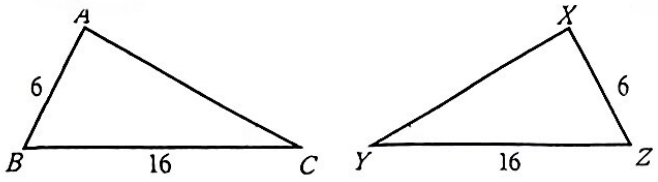


24. According to the figure below, which of the following is correct?




A. $\Delta RST \cong \Delta WVU$ *(RHS)*
B. $\Delta RST \cong \Delta WVU$ *(SAS)*
C. $\Delta RST \cong \Delta WVU$ *(SSA)*
D. $\Delta RST \cong \Delta WVU$ *(AAS)*

25. How many pair of corresponding angles in the following figures?




A. 1
B. 2
C 3
D. Can not be determined

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