

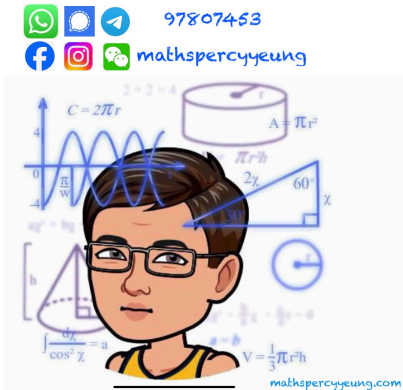
CSWCSS F3 Final 2025-26 P1

F3 Mathematics Paper 1 – Final Examination (2025-2026)

P.1

F.3 Mathematics Paper 1 – Final Examination (2025-2026) (Solution)

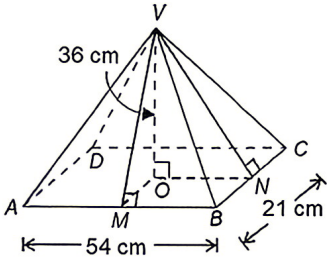
1. Solve the inequality $10x \geq 3(x+5) - 1$ and represent the solutions graphically. (4 marks)



2. A shopkeeper bought some oranges at \$4 each. 8 oranges were rotten before sales. The remaining oranges were all sold at \$4.5 each. Let x be the number of oranges he bought. If the shopkeeper did not suffer a loss, at least how many oranges did he buy?

F.3 Mathematics Paper 1 – Final Examination (2025-2026) (Solution)

3. The figure below shows a right pyramid $VABCD$ with a rectangular base $ABCD$. It is given that $VM \perp AB$, $VN \perp BC$, $VO \perp ON$, $VO \perp OM$, $AB = 54$ cm, $BC = 21$ cm and the height VO of pyramid is 36 cm.



- (a) Find the volume of pyramid $VABCD$. (2 marks)
(b) Find VM and VN in the figure. (4 marks)
(c) Hence or otherwise, find the total surface area of pyramid $VABCD$. (2 marks)

5. Bag *A* contains four cards numbered 2, 3, 5 and 7 respectively while Bag *B* contains five cards numbered 4, 6, 8, 9 and 10 respectively.

(a) List all the possible outcomes in the following table.

(2 marks)

	2 nd	Bag <i>B</i>				
		4	6	8	9	10
Bag <i>A</i> 1 st	2					
	3					
	5					
	7					

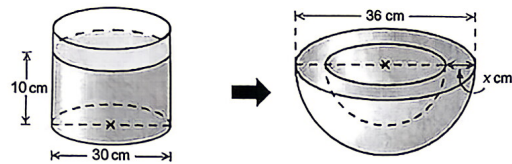
(b) Find the probability that both outcomes are even numbers.

(2 marks)

(c) Find the probability that the sum of the two numbers drawn is less than 10.

(2 marks)

4. In the figure, the right circular cylindrical vessel contains water to a depth of 10 cm. The water is then poured into the hemispherical bowl with uniform thickness x cm. If the water can just fully-fill the bowl, find the value of x .



6. A supermarket's total income on food, kitchenware and toiletries in a certain month is \$800 000, in the ratio 6 : 3 : 1. If the incomes on food and kitchenware are increased by 12% and 9% respectively, while the income on toiletries is decreased by 15%, find
- (a) the new total income on food, kitchenware and toiletries, (4 marks)
- (b) the percentage change in the total income on the above three items. (2 marks)

7. The following table shows the ages of 50 children in a drawing class.

Age	4	5	6	7	8	9
Number of children	8	7	x	5	y	4

If their median age is 6.5, find

- (a) the values of x and y , (3 marks)
- (b) the mean and the mode of the ages of the children in the drawing class. (3 marks)

8. Simplify the following and express your answer with positive indices.

(a) $\frac{(a^2)^5 b^6}{a^{11} (b^{-3})^2}$

(4 marks)

(b) $\left(\frac{10u^2}{v^{-3}}\right)^{-2} \div \left(\frac{8v^{-5}}{u^4}\right)^{-1}$

(4 marks)

9. Miss Tam deposited \$72 000 in a bank at a simple interest rate. She received an amount of \$73 440 after half a year.

(a) Find the annual interest rate. (3 marks)

(b) If the principal remained unchanged and the interest in (a) was compounded quarterly, how much more interest could she receive? (4 marks)

(Give your answers correct to 3 significant figures if necessary)

10. Factorize

(a) $3x - 9y$,

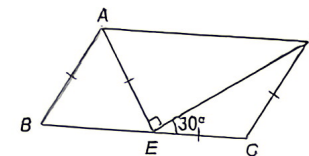
(b) $x^2 + 2xy - 15y^2$,

(c) $x^2 + 2xy - 15y^2 - 3x + 9y$.

11. (a) Prove that $(\sin \theta + \cos \theta)^2 - 2 \tan \theta \cos^2 \theta = 1$ is an identity. (3 marks)

(b) Prove that $\frac{(1 - \sin^2 \theta) \sin(90^\circ - \theta)}{\tan^2(90^\circ - \theta)} = \cos \theta (1 + \cos \theta) [1 - \sin(90^\circ - \theta)]$ is an identity. (4 marks)

12. In the figure, $ABCD$ is a quadrilateral. E is a point on BC such that $AB = AE = CD = CE$ and $AE \perp DE$.

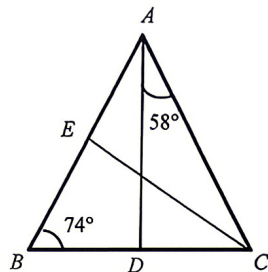


If $\angle CED = 30^\circ$,

(a) find $\angle ABE$ and $\angle DCE$, (4 marks)

(b) prove that $ABCD$ is a parallelogram. (3 marks)

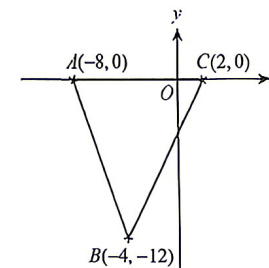
13. In $\triangle ABC$, D is a point on BC such that AD is an altitude of $\triangle ABC$. E is a point on AB such that CE is the angle bisector of $\angle ACB$. $\angle DAC = 58^\circ$ and $\angle ABC = 74^\circ$.



- (a) Find $\angle AEC$. (4 marks)
 (b) Prove that CE is the perpendicular bisector of AB . (3 marks)

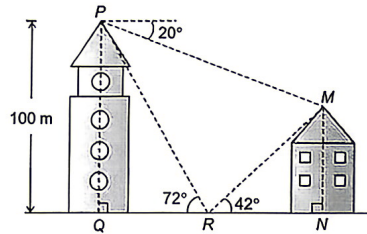
(3)

14. The figure shows $\triangle ABC$.



- (a) Find the slope of AB . (2 marks)
 (b) Find the coordinates of the circumcentre of $\triangle ABC$. (4 marks)
 (c) Find the difference in the area between the circumcircle of $\triangle ABC$ and $\triangle ABC$. (3 marks)

15. The figure shows a tower PQ of height 100 m and an apartment MN . R is a point between Q and N such that Q , R and N lie on a straight line. It is given that the angles of elevation of P and M from R are 72° and 42° respectively, and the angle of depression of M from P is 20° . Let h m be the height of an apartment MN .



- (a) Express QN in terms of h . (2 marks)
 (b) Hence or otherwise, find the value of h . (3 marks)
 (c) Hence, find the angle of depression of N from P . (3 marks)
- (Give your answer correct to the 3 significant figures if necessary.)