

End of Year Examination Paper 2

INSTRUCTION TO CANDIDATES:

1. Answer **all** questions.
2. Write your answers and working in the spaces provided.
3. Omission of essential working will result in loss of marks.
4. Calculators may be used in this paper.
5. If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer correct to three significant figures. Give answers in degrees correct to one decimal place.

Marks Obtained
50

1 With the use of a calculator,

- (a) evaluate $3 - \frac{\sqrt{3.5 + 4.71^2}}{3.76}$, correct to 4 significant figures,
- (b) express $\frac{13}{99}$ as a recurring decimal,
- (c) evaluate the 18th multiple of 23.

Ans: (a) _____ [1]

(b) _____ [1]

(c) _____ [1]

- 2** Johnny bought 15 identical books for a total of \$ m and 6 identical pens at \$ n each. He paid the cashier \$ p . Find, in terms of m , n and/or p ,
- (a) the cost of 1 book.
 - (b) the amount of change he received.

Ans: (a) \$ _____ [1]

(b) \$ _____ [2]

3 (a) Solve the following equations.

(i) $3 - x = 5x$

Ans: (a)(i) $x =$ _____ [2]

(ii) $3a + 7 = 2(2 - 5a)$

Ans: (a)(ii) $a =$ _____ [2]

(b) Given the formula $W^2 = \frac{S}{T-17}$, find the value of S when $W = -2$ and $T = 20$.

Ans: (b) $S =$ _____ [2]

4 (a) Express 3000 cm^2 as a percentage of 2.5 m^2 .

Ans: (a) _____ % [2]

(b) During a shipment of a batch of vases, 5% of them were broken, $\frac{1}{16}$ were stolen and the rest were transported safely.

(i) Calculate the percentage of vases that were stolen.

(ii) Given that 3550 vases were transported safely, calculate the initial number of vases that were shipped.

Ans: (b)(i) _____ % [1]

(ii) _____ [2]

- 5** A train travels at 160 km/h for 1h 30 min, rests for 30 min at a station, and then travels the remaining 300 km for 2 h. Find
- (a) the distance travelled by the train before the rest,
 - (b) the speed of the train after the rest,
 - (c) the average speed of the whole journey.

Ans: (a) _____ km [1]

(b) _____ km/h [1]

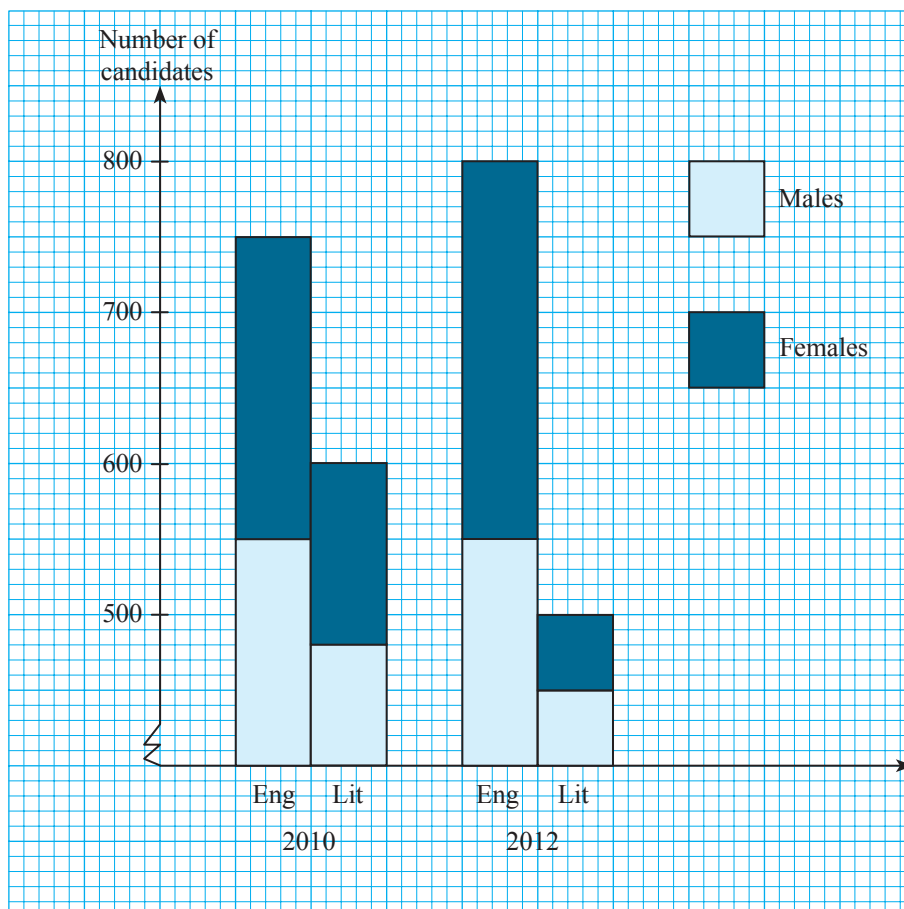
(c) _____ km/h [2]

- 6** In a cake recipe, the ratio of the volume of water, eggs and syrup is 12 : 3 : 2. If 120 ml of eggs were used, find
- (a) the volume of water required,
 - (b) the cost of the syrup, given that it costs 2 ¢/ml.

Ans: (a) _____ ml [2]

(b) \$ _____ [2]

- 7 The following chart shows the number of male and female candidates taking a national examination in the subjects of English and Literature in 2010 and 2012 in a junior college.



- (a) Calculate the ratio of male candidates to that of female candidates taking the English examination in 2010.
- (b) Find the number of candidates taking Literature in 2010 and 2012 respectively.
- (c) Using your answer in (b), explain how does the graph mislead readers.

Ans: (a) _____ : _____ [2]

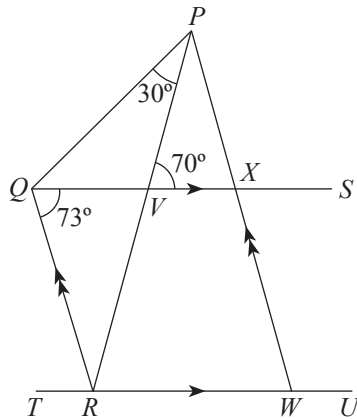
(b) 2010: _____ [1]

2012: _____ [1]

(c) _____

_____ [1]

- 8 In the diagram below, $QS \parallel TU$ and $QR \parallel PW$.



Find

- (a) $\angle PQV$,
- (b) $\angle VRQ$,
- (c) $\angle RPW$.

Ans: (a) $\angle PQV = \underline{\hspace{2cm}}^\circ$ [1]

(b) $\angle VRQ = \underline{\hspace{2cm}}^\circ$ [1]

(c) $\angle RPW = \underline{\hspace{2cm}}^\circ$ [1]

- 9 Machine A can print x books in an hour, while Machine B can print 60 **more** books in an hour. In 24 hours, Machine A and Machine B print a total of 2400 books.
- (a) Form an equation in x and solve it.
- (b) Calculate the time in hours Machine B alone takes to print 2400 books.

Ans: (a) $x =$ _____ [3]

(b) _____ hours [1]

- 10** The diagram shows a solid hexagonal prism. The cross-section of the prism is a regular hexagon made up of six equilateral triangles, with sides of length 6 cm. The length of the prism is 25 cm. Calculate
- (a) the volume of the prism,
 - (b) the total surface area of the prism.

Ans: (a) _____ cm^3 [3]

(b) _____ cm^2 [2]

11 The diagram shows a sequence of figures formed by triangles and small dots.

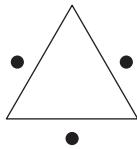


Figure 1

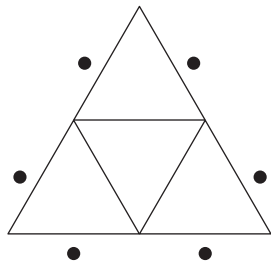


Figure 2

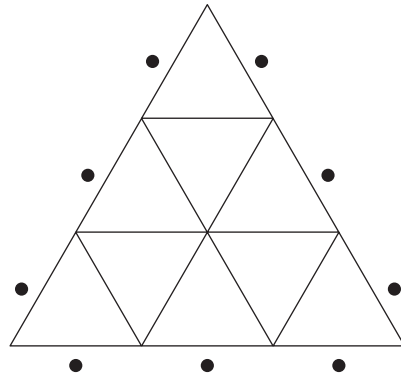


Figure 3

Let the number of triangles and dots in Figure n be T_n and D_n respectively.

(a) Draw the 4th figure.

(b) Complete the following table.

n	1	2	3	4
T_n	1	4		
D_n	3			

(c) Find an expression for D_n .

(d) Find

- (i) the number of triangles in Figure 5,
- (ii) the number of dots in Figure 15.

Ans: (a) on answer space [2]

(b) on answer space [2]

(c) $D_n =$ _____ [2]

(d) (i) _____ [1]

(ii) _____ [1]

Solutions to:

End of Year Examination Paper 2

1. (a) $3 - \frac{\sqrt{3.5 + 4.71^2}}{3.76} \approx 1.6521414$
 $\qquad\qquad\qquad = 1.652 \quad (4 \text{ s.f.})$
- (b) $\frac{13}{99} = 0.13131313 \dots$
 $\qquad\qquad\qquad = 0.\dot{1}\dot{3}$
- (c) $18^{\text{th}} \text{ multiple of } 23 = 18 \times 23$
 $\qquad\qquad\qquad = 414$
2. (a) $\$ \frac{m}{15}$
- (b) Cost of 6 pens = $\$6n$
 Change received = $\$(p - 6n - m)$
3. (a) (i) $3 - x = 5x$
 $\qquad\qquad\qquad 3 = 6x$
 $\qquad\qquad\qquad x = \frac{3}{6}$
 $\qquad\qquad\qquad = \frac{1}{2}$
- (ii) $3a + 7 = 2(2 - 5a)$
 $\qquad\qquad\qquad 3a + 7 = 4 - 10a$
 $\qquad\qquad\qquad 10a + 3a = 4 - 7$
 $\qquad\qquad\qquad 13a = -3$
 $\qquad\qquad\qquad a = -\frac{3}{13}$
- (b) When $W = -2$ and $T = 20$,
 $(-2)^2 = \frac{S}{20 - 17}$
 $4 = \frac{S}{3}$
 $S = 12$
4. (a) $2.5 \text{ m}^2 = (2.5 \times 100 \times 100) \text{ cm}^2$
 $\qquad\qquad\qquad = 25000 \text{ cm}^2$
 Required percentage = $\frac{3000}{25000} \times 100\%$
 $\qquad\qquad\qquad = 12\%$
- (b) (i) Percentage stolen = $\frac{1}{16} \times 100\%$
 $\qquad\qquad\qquad = 6.25\%$
- (ii) Percentage transported safely
 $= 100\% - 5\% - 6.25\%$
 $= 88.75\%$
 Initial number of vases = $\frac{3550}{88.75\%} \times 100\%$
 $\qquad\qquad\qquad = 4000$
5. (a) $1 \text{ h } 30 \text{ min} = 1.5 \text{ h}$
 Distance travelled before rest = 160×1.5
 $\qquad\qquad\qquad = 240 \text{ km}$
- (b) Speed of train after rest = $300 \text{ km} \div 2 \text{ h}$
 $\qquad\qquad\qquad = 150 \text{ km/h}$
- (c) Average speed = $\frac{\text{Total distance travelled}}{\text{Total time taken}}$
 $\qquad\qquad\qquad = \frac{240 + 300}{1.5 + 0.5 + 2}$
 $\qquad\qquad\qquad = 135 \text{ km/h}$
6. (a) Volume of water used = $\frac{120 \text{ ml}}{3} \times 12$
 $\qquad\qquad\qquad = 480 \text{ ml}$
- (b) Volume of syrup used = $\frac{120 \text{ ml}}{3} \times 2$
 $\qquad\qquad\qquad = 80 \text{ ml}$
 Cost of syrup = $80 \text{ ml} \times 2 \text{ ¢/ml}$
 $\qquad\qquad\qquad = 160\text{¢}$
 $\qquad\qquad\qquad = \$1.60$
7. (a) Required ratio = $550 : (750 - 550)$
 $\qquad\qquad\qquad = 550 : 200$
 $\qquad\qquad\qquad = 11 : 4$
- (b) Number of Literature candidates in 2010 = 600
 Number of Literature candidates in 2012 = 500
- (c) Visually, it appears that the number of candidates taking Literature in 2010 is twice that of 2012, but from (b), it is not. This happens because the vertical axis does not start from zero.
8. (a) $\angle PQV = 70^\circ - 30^\circ$ (ext. \angle of $\triangle PQV$)
 $\qquad\qquad\qquad = 40^\circ$
- (b) $\angle VRQ = 180^\circ - 30^\circ - 40^\circ - 73^\circ$ (\angle sum of $\triangle PQR$)
 $\qquad\qquad\qquad = 37^\circ$
- (c) $\angle RPW = \angle VRQ$ (alt. \angle s, $QR \parallel PW$)
 $\qquad\qquad\qquad = 37^\circ$
9. (a) Machine B prints $(x + 60)$ books per hour.
 $24x + 24(x + 60) = 2400$
 $24x + 24x + 1440 = 2400$
 $48x = 960$
 $x = 20$
- (b) Rate of Machine B = $(20 + 60)$ books/h
 $\qquad\qquad\qquad = 80 \text{ books/h}$
 Time taken by Machine B only = $2400 \div 80$
 $\qquad\qquad\qquad = 30 \text{ hours}$
10. (a) Base area = $6\left(\frac{1}{2} \times 6 \times 4\right)$
 $\qquad\qquad\qquad = 72 \text{ cm}^2$
 Volume of prism = 72×25
 $\qquad\qquad\qquad = 1800 \text{ cm}^3$

(b) Total surface area
 $= (\text{Perimeter of base} \times \text{height}) + 2(\text{base area})$
 $= (6 \times 6 \times 25) + 2(72)$
 $= 1044 \text{ cm}^2$

11. (a)

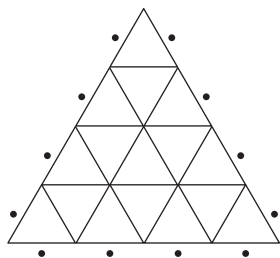


Figure 4

(b)

n	1	2	3	4
T_n	1	4	9	16
D_n	3	6	9	12

(c) 3, 6, 9, 12 are multiples of 3.

$$\therefore D_n = 3n$$

(d) (i) From the pattern of T_n ,

$$1, 4, 9, 16, \underline{25} \qquad T_n = n^2$$

$$(1^2) (2^2) (3^2) (4^2) (5^2)$$

$$\therefore T_5 = 25$$

(ii) $D_{15} = 3(15)$ substitute $n = 15$

$$= 45$$