

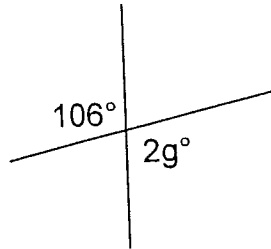


**Question 1. Similarity, Geometry and Congruence.**

**15 marks.**

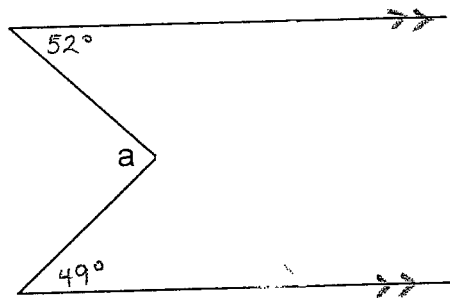
a) Find the value of the pronumeral in the following:

(i)



2

(ii)



2

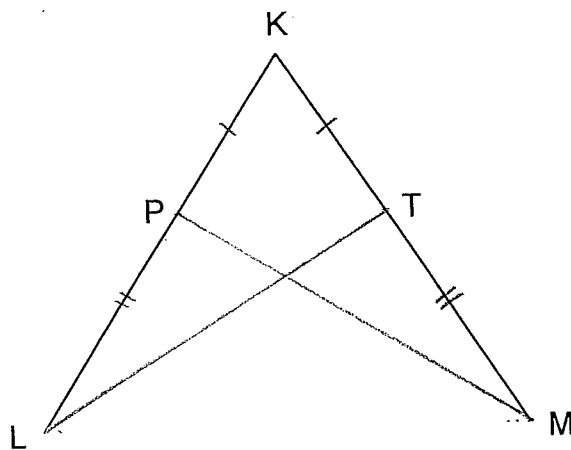
b) Given  $KT = KP$  and  $PL = TM$ :

(i) Prove  $\triangle KLT \cong \triangle KPM$

3

(ii) What is the length of  $LT$  if  $PM = 5\text{cm}$ ?

1



c) A triangle has been enlarged (small length to big length) in the ratio 2 : 5. What would a smaller length of 4cm convert to?

1

d) A cargo ship is 150m in length. A wooden model of the ship is built that is 30cm in length. What scale has been used to create the model?

1

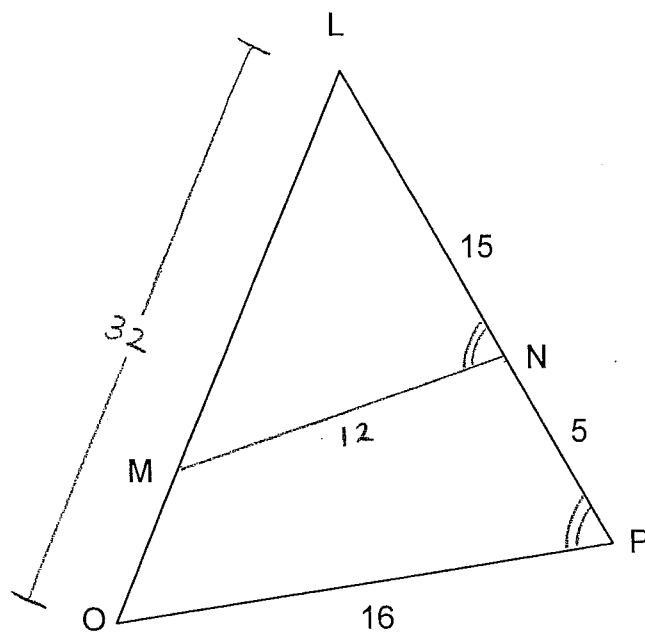
e)

(i) Prove that  $\triangle LPO \sim \triangle LNM$   
(Note:  $MN$  and  $OP$  are **NOT** parallel)

3

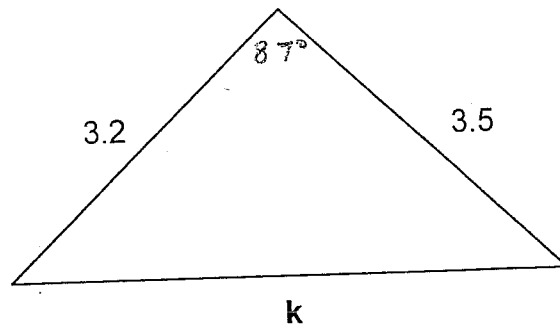
(ii) Hence find the length of the side  $MO$ .

2

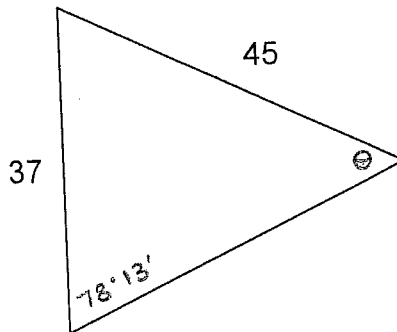


**Question 2.****Trigonometry.****15 marks.**

- a) Find the length of side  $k$ , to 3 significant figures.

**2**

- b) Find the size of  $\theta$ , to the nearest minute.

**2**

- c) An isosceles triangle has equal sides of 15cm and the angle where these two sides meet is  $80^\circ$ .

- (i) Find the height of the triangle, to the nearest cm. **2**
- (ii) Calculate the area of the isosceles triangle, to 1 decimal place. **2**

- d) A ship sails for 1.3km on a bearing of  $46^\circ 21'$ , it then turns and sails for another 2.1km on a bearing of  $151^\circ 44'$ .

- (i) How far is the ship from its start point, to the nearest km? **2**
- (ii) What is the bearing of the ship from its start point, to nearest degree? **2**

- e) The angle of depression of a man from a plane is  $9^\circ$ . The plane travels toward the man for another 6.5km and the angle of depression is now  $38^\circ$ . Find the altitude of the plane. **3**

**Question 3.****Further Algebra.****15 marks.****a)** Solve the following questions simultaneously:**4**

(i)  $g = 3c - 1$  and  $g - 2c = 5$

(ii)  $m^2 + n^2 = 9$  and  $m + n - 3 = 0$

**b)** Form a pair of simultaneous and solve them to find the answer for the following question:**4**

'Noah is a builder and owns 8 trucks, some of which carry a load of 10 tonnes and others that carry a load of 5 tonnes. When all 8 trucks are filled they carry a total load of 70 tonnes. How many of each of truck does Noah own?'

**c)** Change the following formula to make "e" the subject:**2**

$$G = \frac{f}{2} - \frac{e}{3}$$

**d)** In the following formula, what values can "k" possibly have?**2**

$$P = \sqrt{4 + 2k}$$

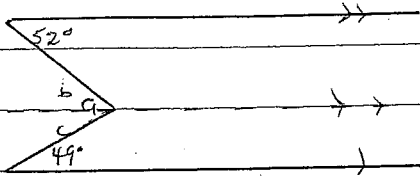
**e)** Factorise the following to find values for 'm'.**3**

$$m^4 - 12m^2 - 64 = 0$$

Question 1

i)  $106 = 2g$  (vert. opp)  
 $g = 53^\circ$  ✓ 2

d)  $lcm: 500cm$  ✓ 1



$a = b + c$

$b = 52$  (alternate)

$c = 49$  (alternate)

ince  $a = b + c$

$a = 52 + 49$

$a = 101^\circ$  ✓ 2

e)  $\angle OLP$  is common.

$\angle LNM = \angle LPO$  (given) ✓

$\therefore \angle LMN = 180 - \angle OLP - \angle LNM$

and  $\angle LOP = 180 - \angle OLP - \angle LPO$  ✓ 3

since  $\angle LMN$  and  $\angle LPO$  are equal

$\therefore \angle LMN = \angle LOP$

$\therefore \triangle LPO \cong \triangle LNM$  (equiangular) ✓ 4

ii) ~~400~~ ~~LP~~ ~~LN~~ ✓

ii)  $\angle LKM$  is common.

~~SP~~  $KP + PL = KT + TM$  ✓

since  $KP + PL = KL$  and  $KT + TM = KM$

$KM = KL$  (given)

$KT = KP$  (given) ✓ 3

$\triangle KLT \cong \triangle KPM$  (SAS) ✓

$\frac{LP}{LN} = \frac{LO}{LM}$

$\frac{20}{15} = \frac{32}{x}$  ✓ 2

$x = 24$

$LO - LM = MO$

$32 - 24 = MO$

$MO = 8$  ✓

i) if  $PM = 5$ ,  $LT = 8$  (corresponding sides in congruent triangles) ✓

10cm. ✓ 1



Question 3

7 b)

xi)  $g = 3c - 1$

~~$g - 2c = 5$~~

$g = 3c - 1$

$g = 5 + 2c$  sub  $g = 3c - 1$  into  $g = 5 + 2c$

$3c - 1 = 5 + 2c$

$c = 6$  ✓

X

sub  $c = 6$  into  $g = 3c - 1$

$g = 3(6) - 1$

$g = 17$

$g = 17, c = 6$  ✓

i)  $m^2 + n^2 = 9$

$m + n - 3 = 0$

~~$n^2 = 9 - m^2$~~

~~$n = 3 - m$~~

~~$n = 3 - m$~~

~~$n = 3 - m$~~  X

~~$n = 3 - m$~~

sub  ~~$m = 3 - n$~~  into  ~~$m + n - 3 = 0$~~

~~$m + n - 3 = 0$~~

j)  $g = \frac{f}{2} - \frac{e}{3}$

~~$6g = 3f - 2e$~~  ✓

$2e = 3f - 6g$

$e = \frac{3f}{2} - 3g$  ✓

d)  $P = \sqrt{4 + 2k}$

$4 + 2k \geq 0$  ✓

$2k \geq -4$

$k \geq -2$  ✓

e)  $m^4 - 12m^2 - 64 = 0$

$(m^2 - 16)(m^2 + 4)$

$(m - 4)(m + 4)(m + 2)(m + 2)$