

FOR THE EXAMINER

EXAM. NUMBER:

Total
Marks:


Coimisiún na Scrúduithe Stáit State Examinations Commission

JUNIOR CERTIFICATE EXAMINATION, 2003

MATHEMATICS - ORDINARY LEVEL - PAPER 2 (300 marks)

MONDAY, 9 JUNE - MORNING, 9:30 to 11:30

Time: 2 hours

Attempt **ALL** questions. Each question carries 50 marks.

Answers and supporting work should be written into the boxes provided.

Extra paper and graph paper can be obtained from the Superintendent, if needed.

The symbol indicates that supporting work must be shown to obtain full marks.

Make and model of calculator used:

For Superintendent/Examiner use only:

Centre Stamp


Question	Mark
1	
2	
3	
4	
5	
6	
Total	
Grade	

- 1. (a)** A ribbon of length 2.5 m is cut into two pieces. One piece measures 97 cm. What is the length of the other piece?


 

- 1(b)** A person travels 48 km to work in the morning and returns home by the same route in the evening.

- (i)** It takes 45 minutes to travel to work.
Calculate the average speed in km/hr.



- (ii)** The person returns home at an average speed of 72 km/hr.
How many minutes does the journey home take?

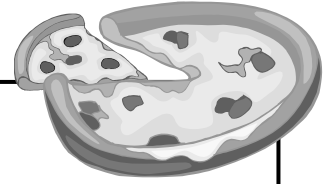



- (iii)** At what time should the person leave work in order to arrive home at $20:15$?



1(c) A small pizza has diameter 20 cm. A large pizza has diameter 30 cm.

(i) What is the area of the base of a small pizza, to the nearest cm^2 .






(ii) What is the area of the base of a large pizza, to the nearest cm^2 .



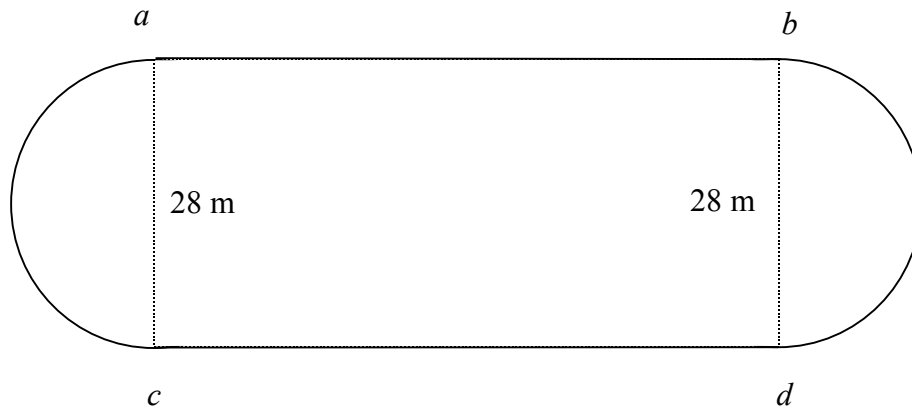
(iii) What is the difference in area between one large pizza and two small pizzas?




2. (a) A ball, in the shape of a sphere, has radius 7 cm.
 Taking π as $\frac{22}{7}$, calculate the surface area of the ball.




- 2(b) An athletics track has a total length of 400 m. The track is made up of two parallel sides, $[ab]$ and $[cd]$, and two semi-circular ends as shown. The diameters of the ends, $[ac]$ and $[bd]$, measure 28 m each.



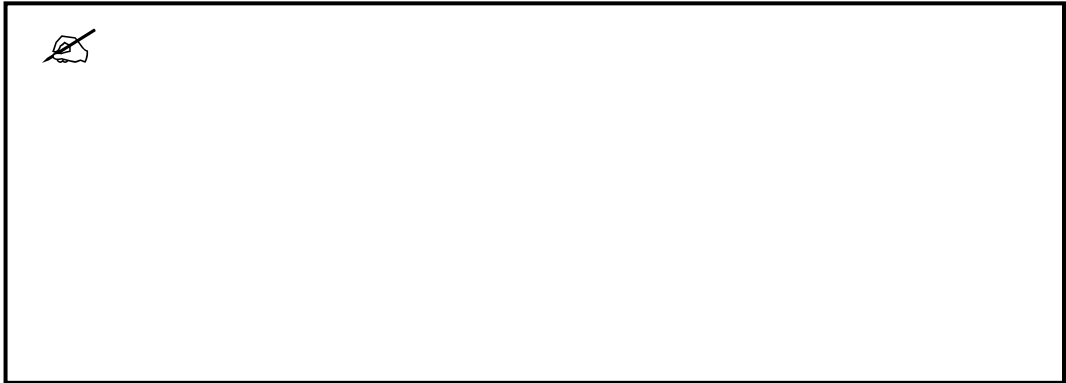
- (i) Taking π as $\frac{22}{7}$, calculate the length of one of the semi-circular ends.



- (ii) Calculate the length of the side $[ab]$.



- 2(c) (i) A rectangular carton full of fruit juice measures 12 cm by 6 cm by 33 cm.
Find the volume of juice in the carton.



- (ii) The juice fills 18 cylindrical glasses exactly. Find the volume of each glass.



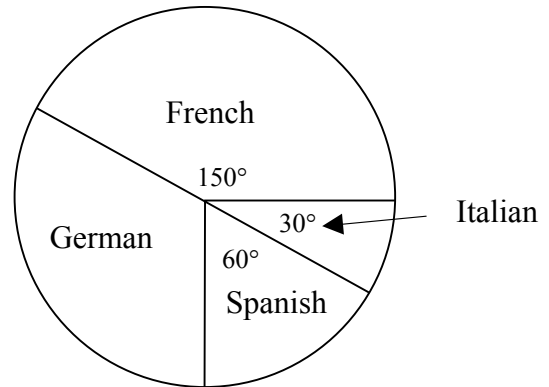
- (iii) The radius of each glass is 3 cm. Calculate the height of each glass, correct to the nearest cm.



3. (a) Three children are aged 2, 5 and 11 years. Calculate their average age.



- 3(b) Each student in a class studies one of the four languages: French, German, Spanish and Italian. The pie-chart represents the number of students that study each language.



- (i) What is the measure of the angle for German?

- (ii) 10 students study French. How many students study Italian?

- (iii) How many students are in the class?

- (iv) How many students do not study Spanish?

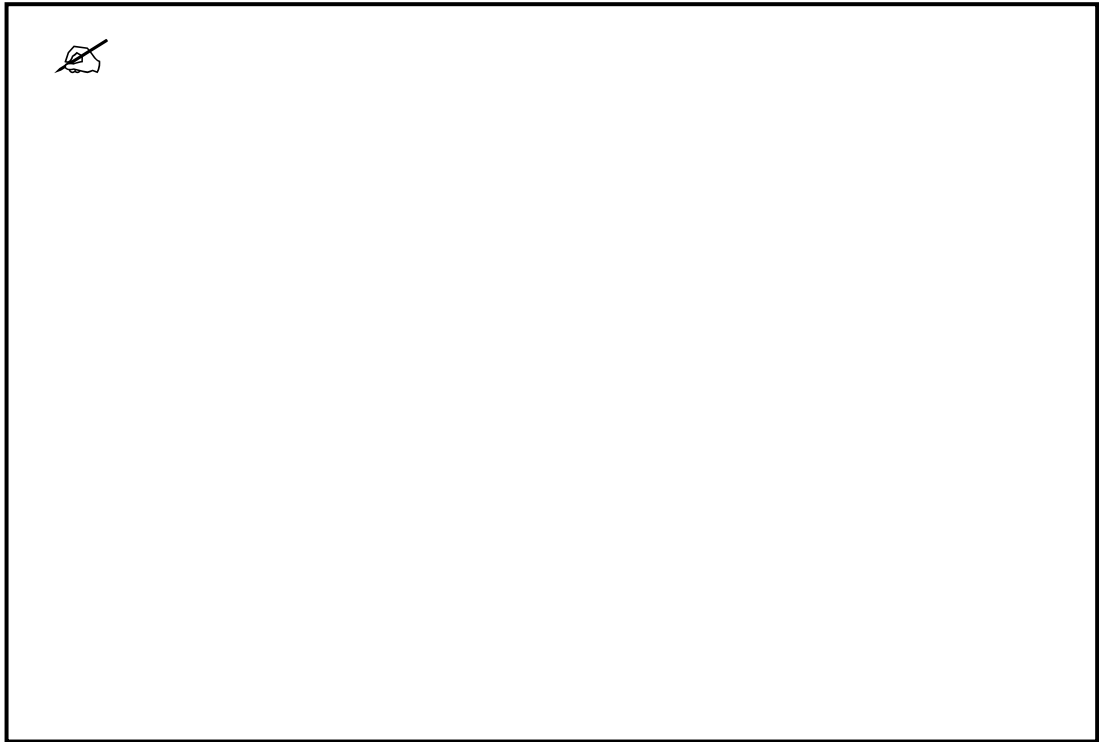
3(c) The following gives the number of days that each of 30 pupils was absent during May:

1 0 2 3 1 0 0 4 5 5
6 5 3 2 0 5 1 0 4 5
3 2 3 6 5 4 3 6 6 0


(i) Complete the following frequency table:

Number of days absent	0	1	2	3	4	5	6
Number of pupils							

(ii) Calculate the mean number of days absent per pupil during May.

A large rectangular box with a black border, intended for the student's answer to question (ii). In the top-left corner, there is a small icon of a hand holding a pencil, indicating where to start writing.

(iii) What percentage of the pupils were absent for three days or more?

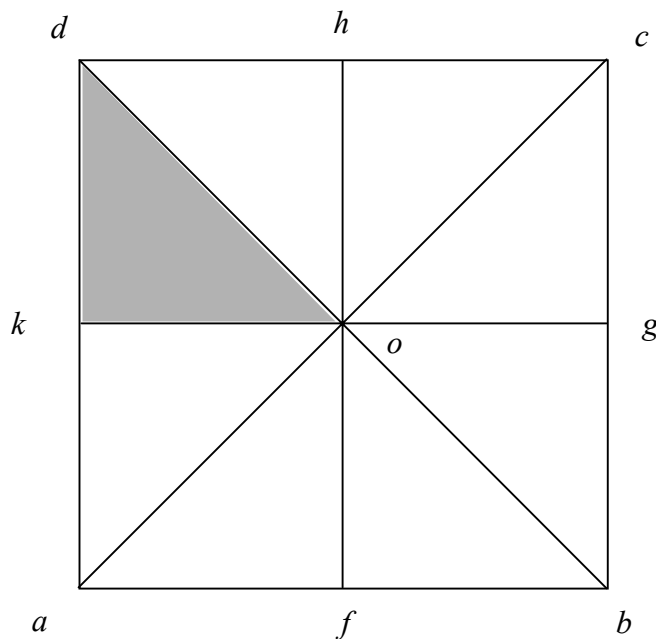
A large rectangular box with a black border, intended for the student's answer to question (iii). In the top-left corner, there is a small icon of a hand holding a pencil, indicating where to start writing.

4. (a) Construct a triangle pqr with $|pq| = 10$ cm, $|pr| = 9$ cm and $|qr| = 7$ cm. Label your diagram clearly.



- 4(b) $abcd$ is a square. The midpoints of the sides are f, g, h and k as shown.

The diagonals intersect at o .



Name the image of Δdko under:

(i) S_o , the central symmetry in the point o

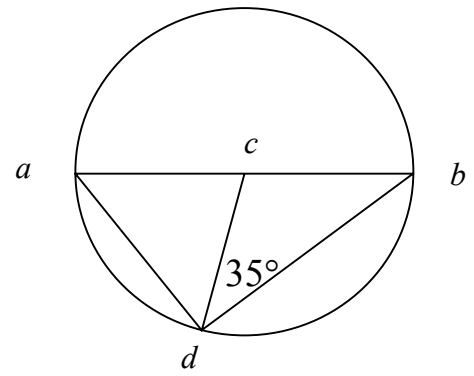
(ii) S_{hf} , the axial symmetry in the line hf

(iii) S_{db} , the axial symmetry in the line db

(iv) S_{ac} , the axial symmetry in the line ac .

part (c) on next page

- 4(c) $[ab]$ is a diameter of the circle with centre c .
 d is a point on the circle as shown.



- (i) Write down $|\angle adb|$, and give a reason for your answer.

$|\angle adb| =$

Reason:

- (ii) Given that $|\angle bdc| = 35^\circ$, name another angle of 35° , and give a reason for your answer.

Name of angle:

Reason:

- (iii) Write down $|\angle acd|$, and give a reason for your answer.

$|\angle acd| =$

Reason:

- (iv) Write down $|\angle cad|$, and give a reason for your answer.

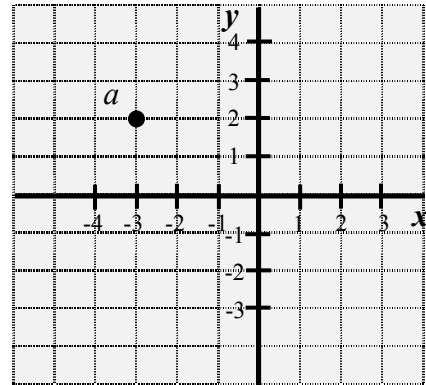
$|\angle cad| =$

Reason:


5. Note: Coordinate Geometry Formulae are given on Page 13.


(a) Write down the coordinates of the point a .


$a =$



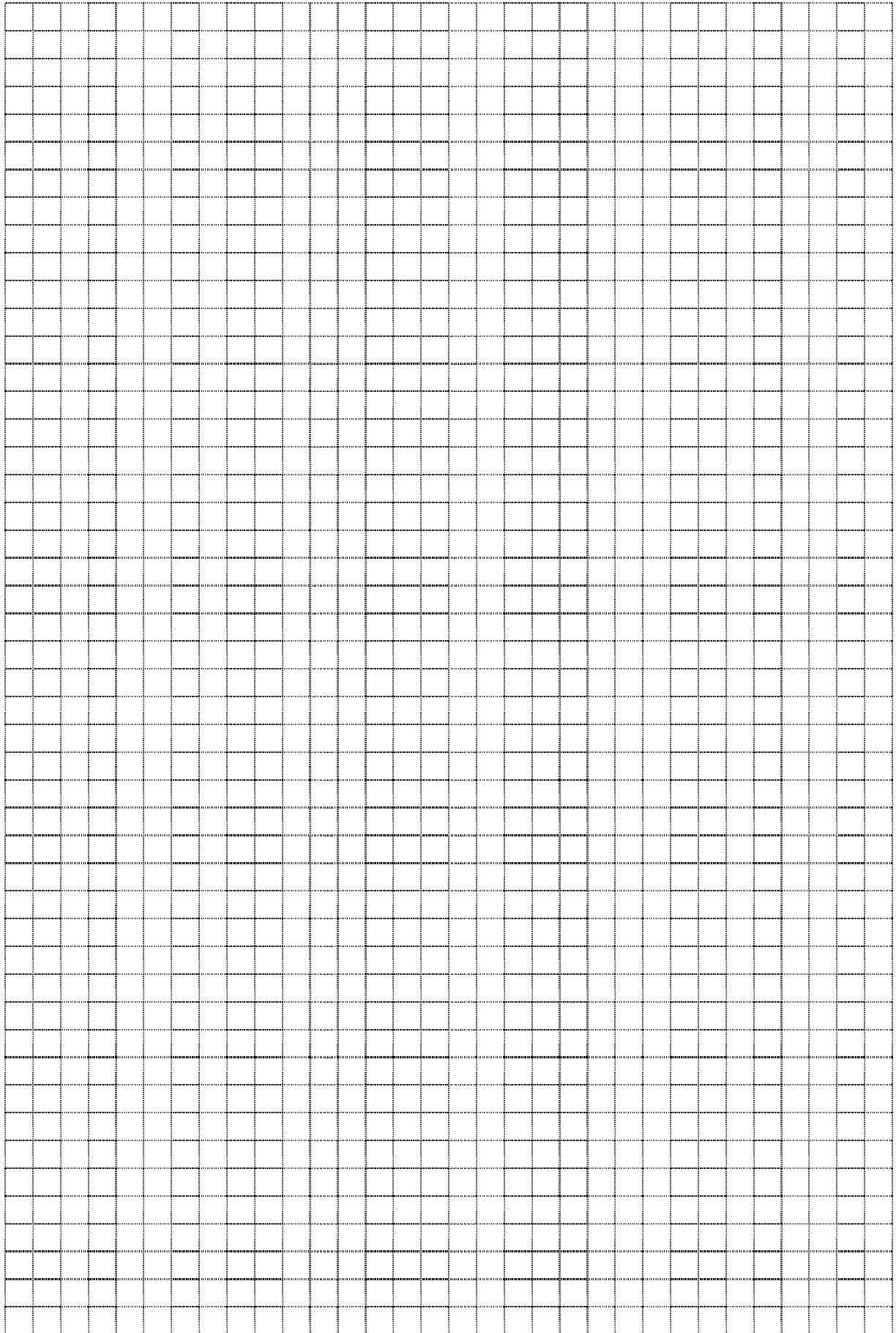
5(b) p is the point (3, 4) and q is the point (-1, 1). Find each of the following:

 (i) the slope of pq

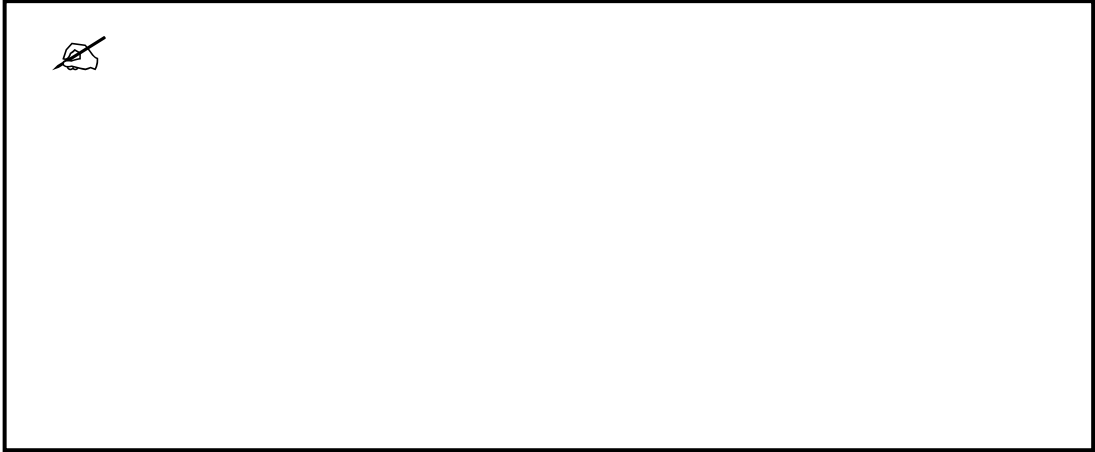
 (ii) the midpoint of $[pq]$

 (iii) the length of $[pq]$.

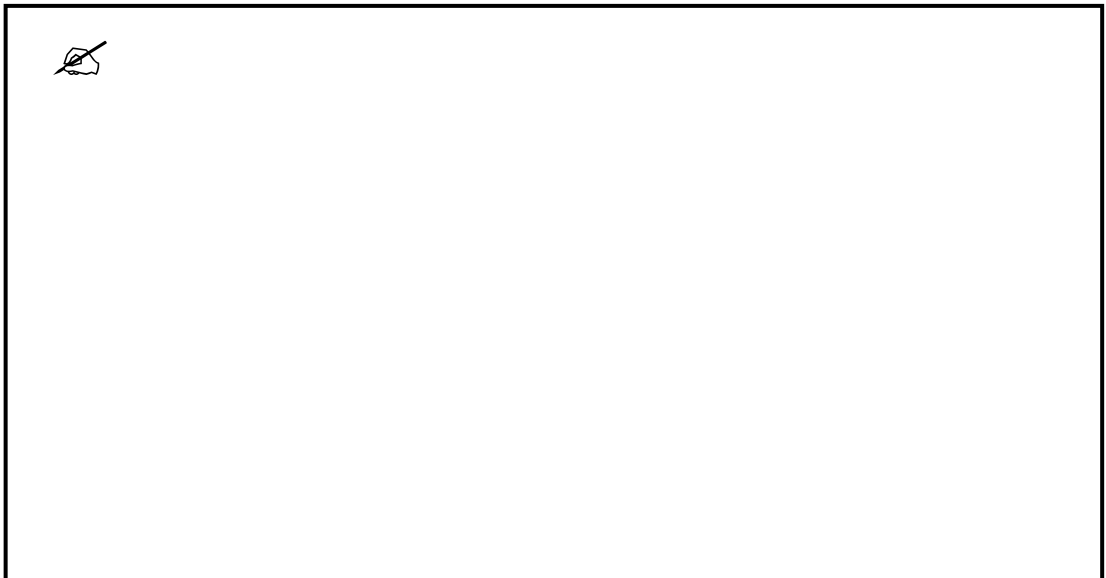
If you wish to draw a diagram, use the next page



- 5(c) (i) The point $(3, k)$ is on the line $2x - 3y + 6 = 0$. Find the value of k .



- (ii) The line M has slope -2 and contains the point $(2, -3)$.
Find the equation of M .



Formulae

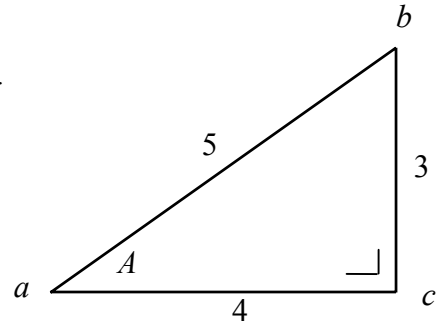
Slope of a line:
$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Mid-point of a line segment:
$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

Length of a line segment:
$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Equation of a line:
$$y - y_1 = m(x - x_1)$$

6. (a) The triangle abc has measurements as shown.



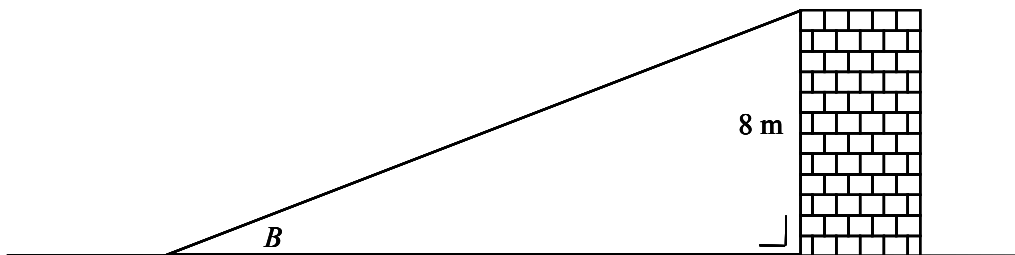
- (i) Write down the value of $\cos A$.

$\cos A =$

- (ii) Write down the value of $\tan A$.

$\tan A =$

- 6(b) A vertical building is 8 m high. It casts a shadow three times its height on horizontal ground.

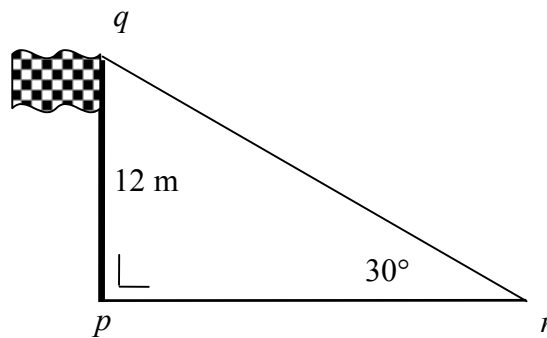


- (i) Write down the length of the shadow.

(ii) Find B , the angle of elevation of the sun, correct to the nearest degree.



6(c) A vertical flagpole $[pq]$, 12 m high, is supported by a cable $[qr]$ as shown in the diagram.



(i) Given that $|\angle qrp| = 30^\circ$, find the length of the cable $[qr]$.



(ii) How far is r from p , the foot of the flagpole?
Give your answer correct to one decimal place.



Space for extra work