**PERTH MODERN SCHOOL**

**Tick your teacher**

* Ms Cheng
* Dr. Pearce
* Ms Sindel
* Ms Rimando



**YR11 MATHEMATICS SPECIALIST – 2018**

**TEST 3 – Vectors**

**NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ DATE: 14/05/2108 Mark:\_\_\_\_\_\_\_\_**

***Calculator Assumed Time: 40 minutes Mark: 35 marks***

**Question 1 (4 marks)**

If and are two vectors. Find:

1. if andare parallel. (2 marks)
2. if and are perpendicular. (2 marks)

**Question 2 (3 marks)**

Consider the points and . Calculate the angle between and

**Question 3 (4 marks)**

1. Find the scalar projection in the direction of o of a vector of magnitude 20 in the direction of 163o.

(2 marks)

1. Let , . Find the vector projection of in the direction of (2 marks)

**Question 4 (5 marks)**

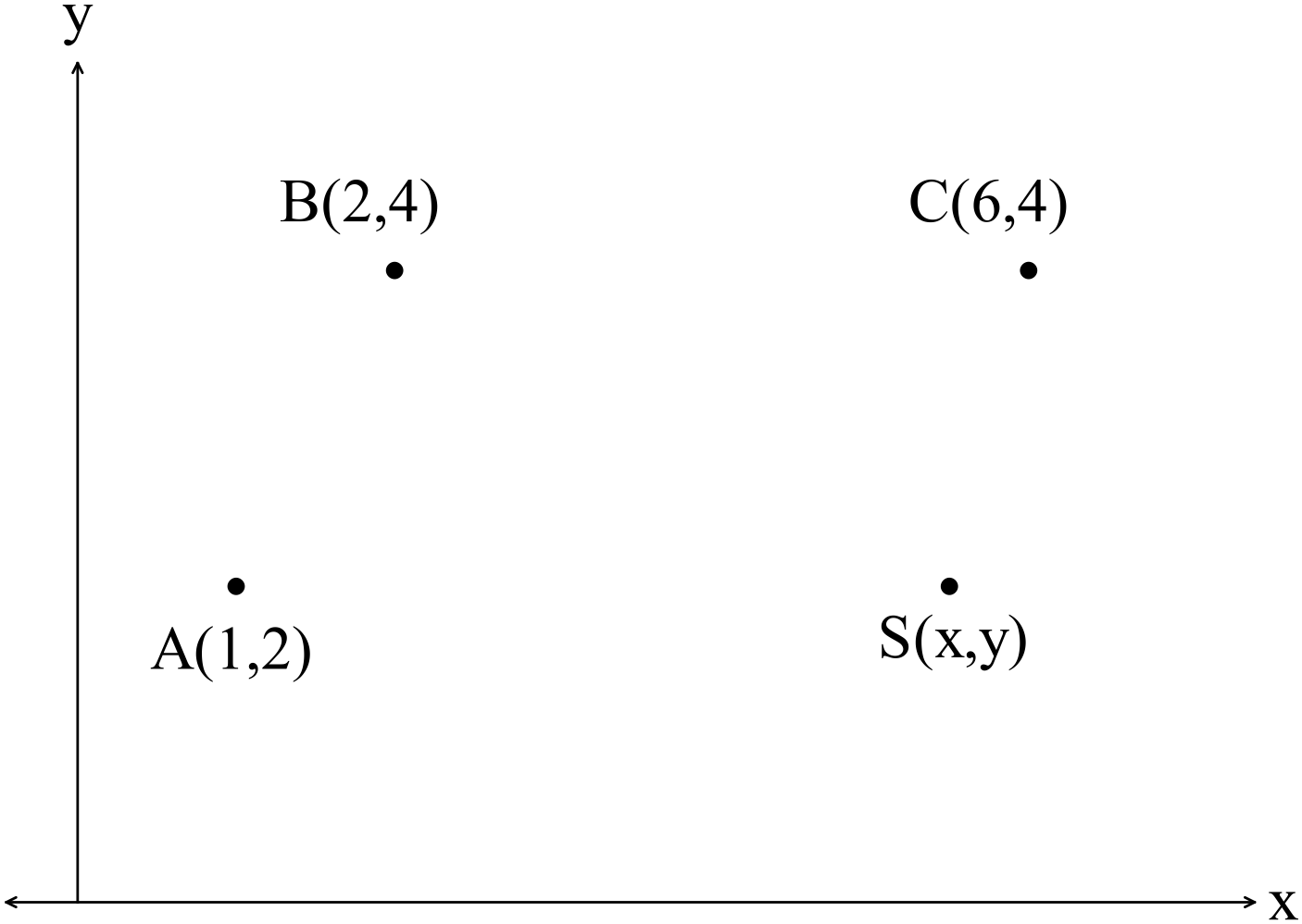
A triangle is formed by three non-zero vectors , and , so that , and is the angle between and .

1. Sketch the triangle. (1 mark)
2. Explain why . (1 mark)

(c) Use to deduce the cosine rule. (3 marks)

**Question 5 (8 marks)**

Consider the quadrilateral in the diagram below.



Use a vector method to

(a) find  if is a parallelogram. (2 marks)

(b) determine the condition(s) required in terms of  so that is a trapezium. (4 marks)

(c) show that points , and the origin are collinear. (2 marks)

**Question 6 (11 marks)**

A small boat that can maintain a steady speed of 5 ms-1 is to cross a river from to , where . A current of flows in the river. The velocity vector that the pilot of the small boat must set to travel from to is , where and are constants.

1. Explain why and , where is a constant. (3 marks)
2. Eliminate from the equations in (a) and hence express in terms of , simplifying your expression.

(3 marks)

(c) Explain why . (1 mark)

(d) Use your equations from (b) and (c) to determine the values of and . (3 marks)

(e) Determine the time that the small boat will take to travel from to . (1 mark)