Peter – Data
Alex – Trig
Ken – C Geo
Virginia = Graph

Year 10 Mathematics 5.3

Term 3 2015

Name:_____ Class:_____

Circle : Mr Wilson / Mr Gong / Mr Cheng / Ms Lego

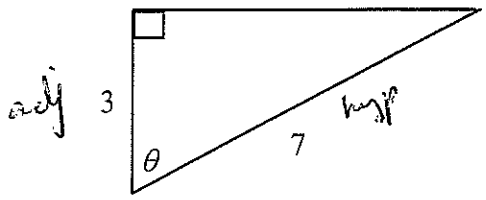
Time allowed: 55 minutes

- Approved calculators may be used
- Show all necessary working
- Marks may be deducted for untidy setting out
- Questions marked with an * are extension level questions
- All questions are worth 1 mark unless otherwise stated

Topic	Trigonometry	Coordinates Geometry	Data	Graph of Physical Ph..	Total
Mark	/16	/9	/16	/6	/47
Extension	/4	/2	/1	/2	/9
Total	/20	/11	/17	/8	/56

Trigonometry

Question 1



Find θ, correct to the nearest minute.

$\cos\theta = \frac{3}{7}$

$\theta = 64^\circ 37'$ **2**

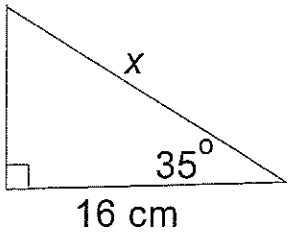
Question 2

Find the value of x in the following triangle (correct to 2 d.p.) **2**

$\frac{16}{x} = \cos 35$

$x = \frac{16}{\cos 35}$

$= 19.53$ cm

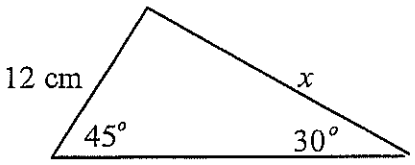


NOT TO SCALE

Question 3

Write down the exact value of $\cos 45^\circ$ $= \frac{1}{\sqrt{2}}$ **1**

Question 4 (4 marks)



180
7x

(a) Find x (give exact values and rationalize your answer) **2**

$\frac{x}{\sin 45} = \frac{12}{\sin 30}$

$x = \frac{12}{\sin 30} \times \sin 45 = \frac{12}{\frac{1}{2}} \times \frac{1}{\sqrt{2}} = \frac{24}{\sqrt{2}} = 12\sqrt{2}$

(b) Hence find the area of this triangle. **2**

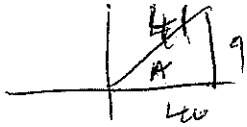
$A = \frac{1}{2} \times 12 \times 12\sqrt{2} \times \sin 105$

$= 72\sqrt{2} \sin 105$

$= 98.35$ cm^2 (correct to 2dp)

Question 5

Given that $\tan A = \frac{9}{40}$, find the value of $\sin A$, in fraction form. **2**



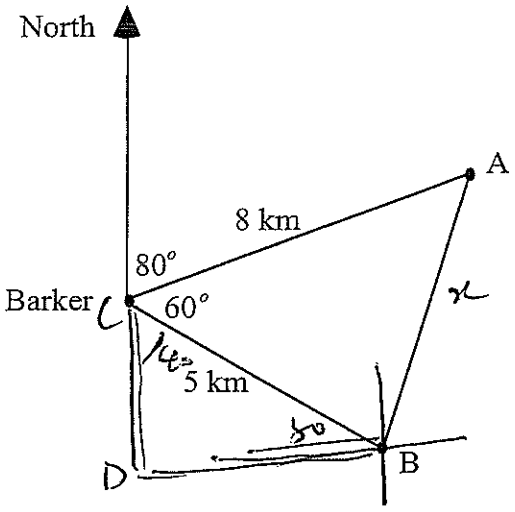
$\sin A = \frac{9}{41}$

Question 6

For what value(s) of θ is $\sin\theta = 0.34$, correct to the nearest minute and given $0° \le \theta \le 180°$? **2**

$\theta = 19° 53'$, $160° 7'$

Question 7



Nicole leaves home at A and walks 8 km to Barker.

Tom leaves home at B and walks 5 km to Barker.

(a) Use the cosine rule to show that the distance AB is 7 km. **2**

$x^2 = 5^2 + 8^2 - 2 \times 5 \times 8 \times \cos 60$

$x = \sqrt{5^2 + 8^2 - 2 \times 5 \times 8 \times \cos 60}$

$= 7$ km

(b) What is the bearing of Barker from B? **1**

$\angle BCD = 40° \Rightarrow \angle CBD = 50°$

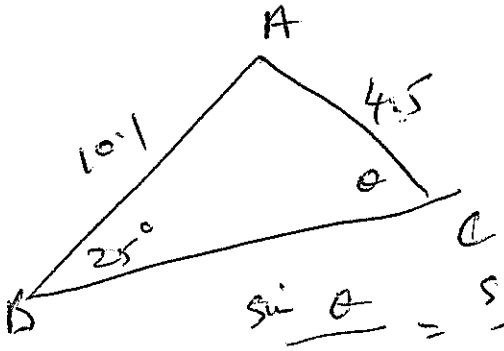
$\therefore$ Bearing of Barker from B

$= 270 + 50$

$= 320°$

***Question 8**

For the triangle ABC, AB is 10.1 cm, AC is 4.5 cm and $\angle ABC$ is 25°. **2**
Find all possible values for $\angle ACB$.



$$\frac{\sin\theta}{10\cdot1} = \frac{\sin 25}{4\cdot5}$$

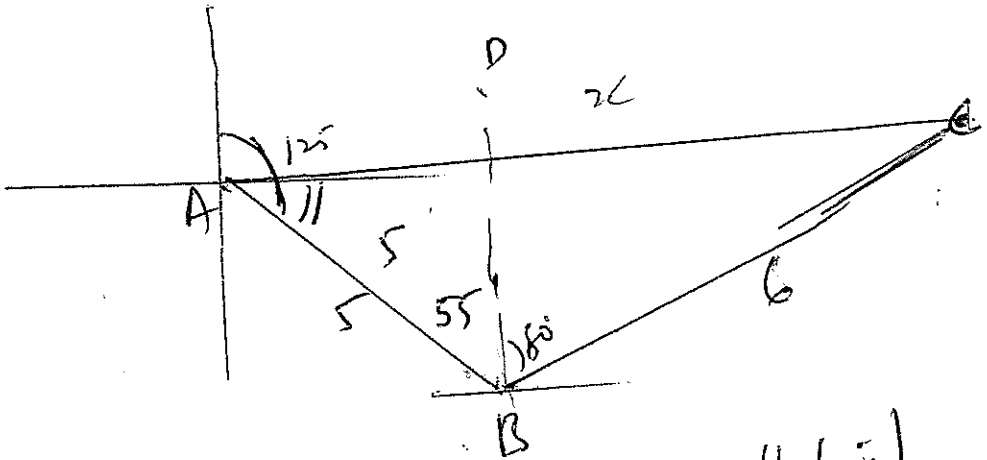
$$\sin\theta = \frac{\sin 25}{4\cdot5} \times 10\cdot1$$

$$\theta = 71° 32' \text{ or } 108° 28'$$

***Question 9**

A man leaves a starting point and walks 5 km on a bearing of 125° and then **2**
6 km on a bearing of 80° and arrives at his destination. How far is his
destination from his starting point, correct to 1 decimal place?

Diagram



$\angle ABD = 55°$ (corr $\angle$s, on // lines)

$\therefore \angle ABC = 55 + 80$
$= 135°$

$\therefore x = \sqrt{5^2 + 6^2 - 2 \times 5 \times 6 \times \cos 135}$
$= 10\cdot1$ km (correct to 1 dp)

Coordinate Geometry

Question 1

Here are four straight lines:

A) $y = 4x - 5$ $m = 4$

B) $4y = x + 11$ $y = \frac{1}{4}x + \frac{11}{4}$

C) $8x - 2y + 3 = 0$ $2y = 8x + 3$, $y = 4x + 3/2$

D) $y = -4x$

(a) Write down the y-intercept of line A. **1**

$x = 0 \quad y = -5 \quad (0, -5)$

(b) Does the point (3, 12) lie on line C? Why or why not? **1**

$8(3) - 2(12) + 3$
$= 24 - 24 + 3$
$= 3 \neq 0$ No, does not satisfy the eq^n

(c) Pick a pair of parallel lines. **1**

A and C $\quad m_A = 4$, $m_C = 4$

(d) Pick a pair of perpendicular lines. **1**

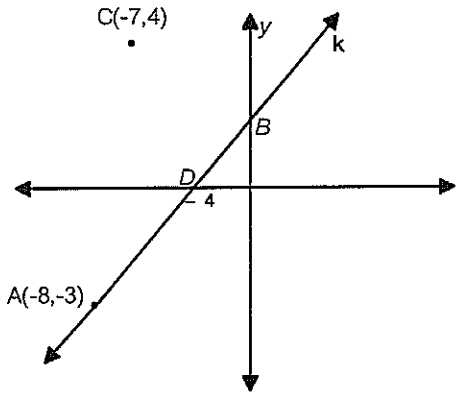
B D $\quad m$ D

$m_B = \frac{1}{4} \quad m_D = -4$

$m_B \times m_D = \frac{1}{4} \times -4 = -1 \Rightarrow \perp$

B and D

Question 3



(a) Show that the equation of the line k is $3x-4y+12=0$. **2**

$A(-8,-3)$ $B(0,3)$ $m = \frac{0+3}{-4+8} = \frac{3}{4}$

$y+3 = \frac{3}{4}(x+8)$

$4y+12 = 3x+24$

$3x-4y+12=0$

(b) Hence find:

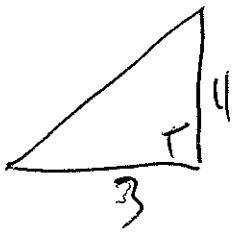
i. the co-ordinates of B; and **1**

$x=0$

$\therefore -4y+12=0$

$y=3$ $\therefore B=(0,3)$

ii. the distance AB. **2**



$= \sqrt{3^2+4^2}$

$= \sqrt{124} = 2\sqrt{31}$

(c) * Show that CD is perpendicular to AB. **2**

$m_{AB} = \frac{3}{4}$

$(-7,4)$ $(-4,0)$

$m_{CD} = \frac{0-4}{-4+7} = \frac{-4}{3}$

$m_{AB} \times m_{CD} = \frac{3}{4} \times \frac{-4}{3} = -1$

$\Rightarrow CD \perp AB$

Data

Question 1

The following table shows the number of hours of homework completed by a Year 10 class.

Number of hours	2	3	4	5	6	7	8
Number of students	1	2	3	3	8	5	2

(a) How many students are in this class? **1**

24

(b) How many students completed less than 5 hours of homework? **1**

6

(c) What fraction of the class completed 6 hours of homework? **1**

$\frac{8}{24} = \frac{1}{3}$

(d) What percentage of the class completed 4 hours of homework? **1**

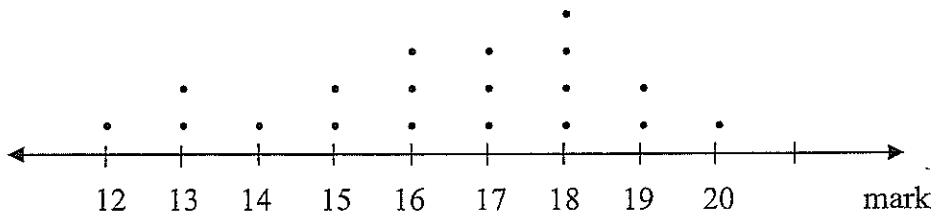
$\frac{3}{24} \times 100$

$= \frac{1}{8} \times 100$

$= 12.5\%$

Question 2

The dot plot below shows the marks obtained in a Year 9 test.



(a) How many pupils sat the test? **1**

19

(b) What was the modal mark (the mode)? **1**

18

(c) What was the median mark? **1**

17

(d) What was the mean mark? **1**

$\bar{x} = 16.368...$

(e) *Find the standard deviation **1**

$\sigma_n = 2.1815...$

Question 4

For the following set of scores

3 7 9 5 5 6 2 8 9 7

2 3 5 5 6 | 7 7 8 9 9

Find

(i) Q_1 5 **1**

(ii) Q_2 $\frac{6+7}{2} = 6.5$ **1**

(iii) Q_3 8 **1**

(iv) IQR $|Q3 - Q1|$

$= 8 - 5$

$= 3$ **1**

Question 3

This back to back, ordered stem and leaf plot shows the marks gained by a Year 9 Maths class before and after revision.

After revision		Before revision
	4	0, 7
4	5	0, 1, 5, 9
	6	3, 3, 3, 4, 8
8 8 7	7	1, 2, 6, 7, 7
9 7 5 5 5 3 0	8	
8 7 2	9	
0 0	10	

(a) Identify the outlier. **1**

54

(b) Calculate the range of marks both before and after revision. **2**

Before : 77 − 40 = 34

After : 100 − 45 = 55

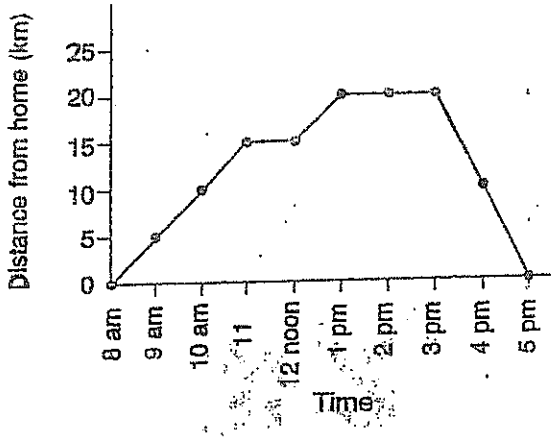
(c) The mean mark before revision is 62·25. Calculate the mean mark after revision. **1**

$\bar{x}$ 2. 79.31 Check

Graph of Physical Phenomenon

Question 1 (2 marks)

This graph shows Penny's distance from home at each hour on a shopping trip.



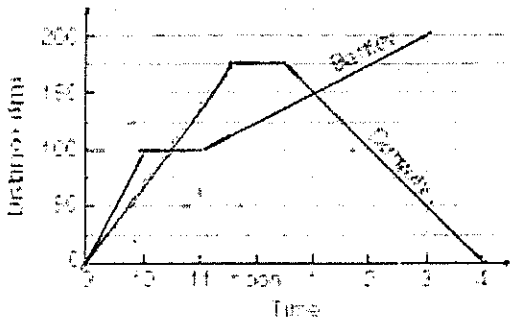
(a) What was the total distance travelled by Penny on her journey? 1

20 + 20 = 40 Km.

(b) What was the average speed of Penny's return journey? 1

$\frac{40}{9} = 4.44$ km/L

Question 2



The graph shows the journeys of two motorists, Conway and Bartley. They are travelling on the same road and in the same direction leaving town A at 9:00 am

(a) Who travel the fastest in the first hour ?

Bartley

1

(b) How many times do they pass each other ?

2

1

(c) How far apart are they at 3:00pm ?

200 − 50 = 150km.

1

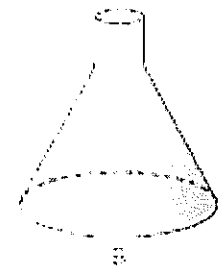
(d) How far did Conway travel ?

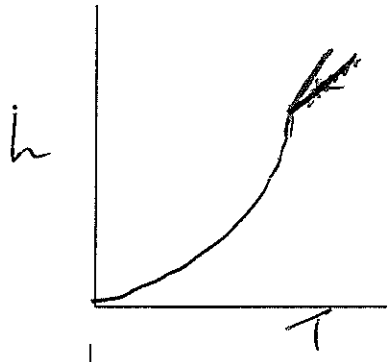
175 x 2 = 350 km.

1

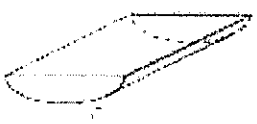
***Question 3**

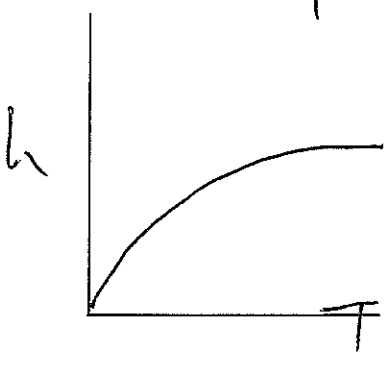
The two containers are filled with water at a steady rate. Plot a graph of the Water level vs Time graph for each of the containers on the number plane provided





1





1