



Student Name MARKING KEY.

**Eastern Goldfields College
Mathematics Applications 2016**

Test 5 (U2 T2) – Calculator Free

Total Marks: 16 marks

Time allowed: 16 minutes

No calculator or notes permitted for this section.

Answer all of the following questions. Show all working to obtain full marks.

Question 1 (5 marks: 1, 2, 2)

State the **gradient** and the co-ordinates of the **y intercept** of each of the following straight lines.

a) $y = 4 - 5x$

$m = -5$
y-int $(0, 4)$ } ✓ R/W.

b) $3y = 6x - 2$

$m = \frac{6}{3} = 2$ ✓ R/W
y-int $= (0, -\frac{2}{3})$ ✓ R/W.

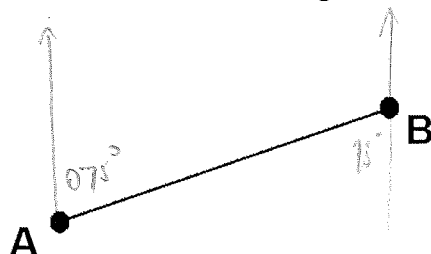
c) $2x + 2y = 10$

$m = -1$ ✓ R/W
y-int $= (0, 5)$ ✓ R/W

-1 overall if not co-ord (x, y)

Question 2 (4 marks: 2, 2)

In the diagram below, Point B is at a true bearing of 075° from point A.



a) What is the compass bearing from A to B?

N 75° E ✓

b) What is the true bearing to A from B?

255° ✓ R/W

180 - 75

-1 units overall paper.

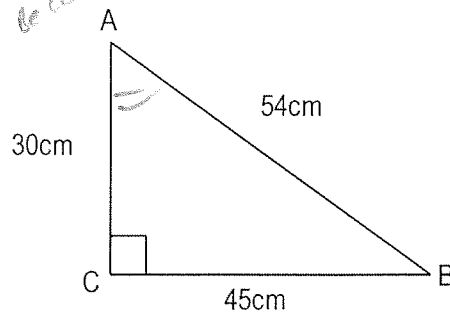
✓ x N 75° S

Question 3 (2 marks: 1, 1)

Consider the triangle ABC.

- a) Determine the value of
- $\sin \angle BAC$
- .

$$\sin \angle BAC = \frac{45}{54} \quad \checkmark \text{ R/W.}$$



$$\sin A = \frac{45}{54} \quad \checkmark \text{ write be careful!}$$

if $\angle BAC = \sin^{-1}(\frac{45}{54})$ X not asked.

- b) If the lengths of the sides of the triangle were all doubled in size, how would this effect the value of
- $\sin \angle BAC$
- ?

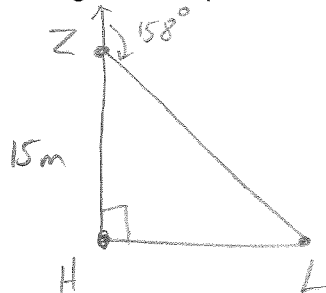
No effect.

No change

stays the same

 $\checkmark \text{ R/W}$ **Question 4 (5 marks: 2, 3)**Harry was 15m due south of Zayn. Liam is due east of Harry and on a bearing of 158° from Zayn.

- a) Draw a diagram to represent the above information.

 \checkmark position of (Z H L) \checkmark labelled correctly including \perp + bearing + 15m

- b) Calculate the distance between Harry and Liam.
- Hint:**
- $\tan 22^\circ = 0.4$
- (approximately)

-1 units. over all paper

$$\tan 22^\circ = \frac{HL}{15} \quad \checkmark$$

$$0.4 \times 15 = HL \quad \checkmark$$

$$6m = HL \quad \checkmark$$

IF

$$\tan 22 = \frac{15}{x}$$

$$15 \times \tan 22 = x$$

$$\checkmark \text{ for } x = 6m \quad \checkmark \text{ OR } \checkmark$$

**Eastern Goldfields College
Mathematics Applications 2016**

Test 5 (U2 T2) – Calculator Assumed

Total Marks: 37 marks

Time allowed: 38 minutes

Calculator and 1 x double sided A4 notes permitted for this section.

Answer all of the following questions. Show all working to obtain full marks.

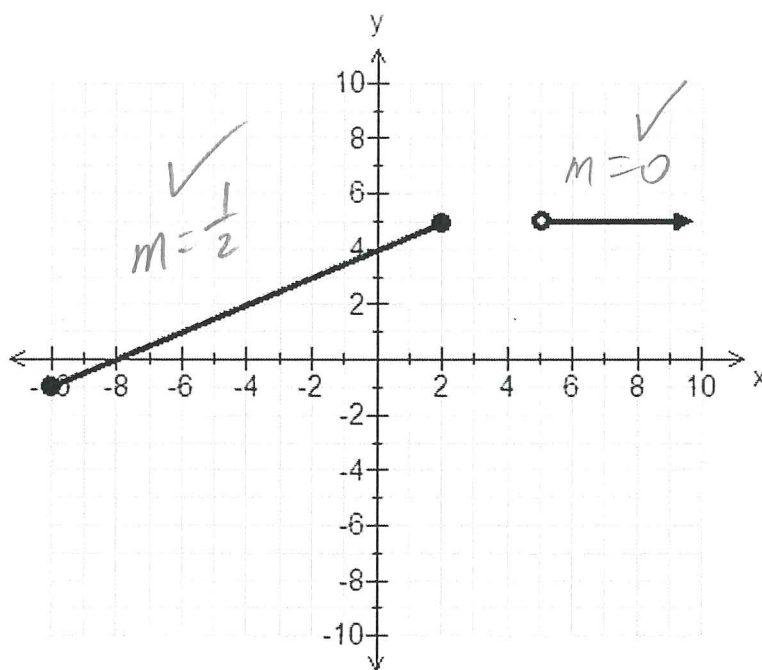
Question 1 (8 marks: 2, 2, 4)

Consider the piecewise function shown.

- a) For what values of x is $y = 5$?

$x = 2$ ✓ r/w
 $x > 5$ ✓
or $5 < x$

- b) Label each of the gradients for each section of this graph.



- c) Write functions to define the graph shown.

$y = \frac{1}{2}x + 4$ ✓ $-10 \leq x \leq 2$ ✓

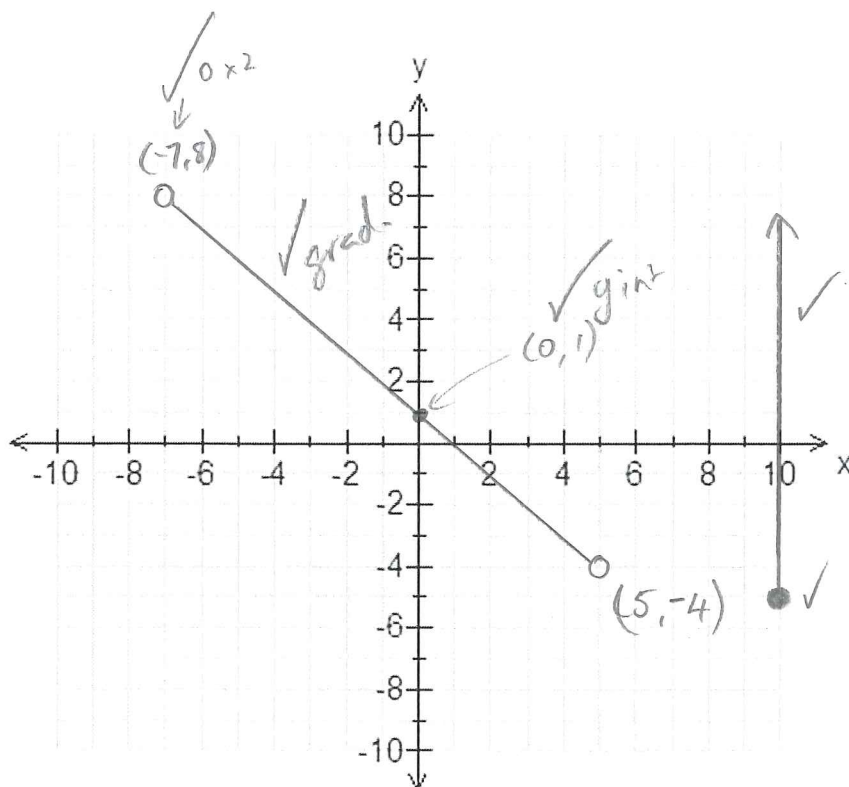
$y = 5$ ✓ $x > 5$ ✓

Question 2 (5 marks: 3, 2)

Graph the following functions on the axes.

a) $y = -x + 1$; $-7 < x < 5$

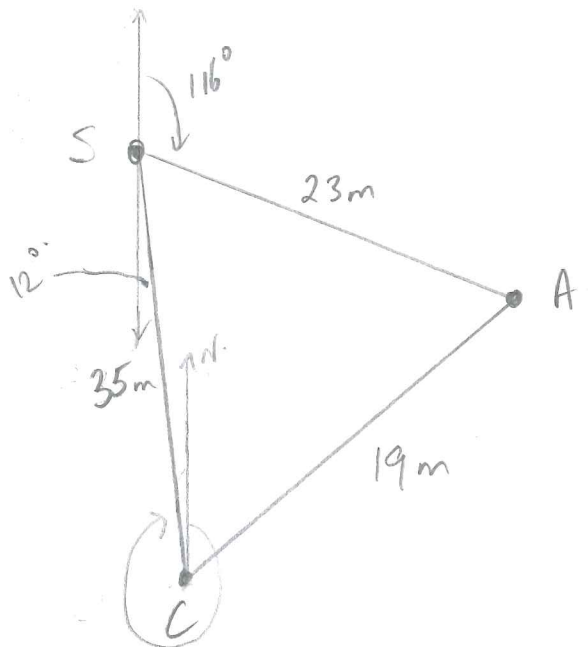
b) $x = 10$; $y \geq -5$



Question 3 (5 marks: 3, 2)

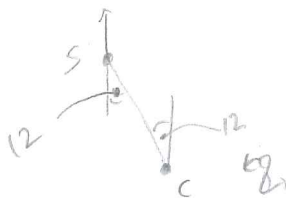
Aimee and Claire are playing hide and seek with Sam in the park. Sam will be seeking. Aimee leaves Sam on a bearing of 116° and goes 23m to hide. Claire leaves Sam and goes 35m on a compass bearing of South 12° East to hide. Claire and Aimee's hiding spots are 19m apart.

- a) Draw a diagram of this situation



✓ labelled + position of S A C
✓ bearings
✓ distances.

- b) What bearing does Claire have to take to return back to Sam?



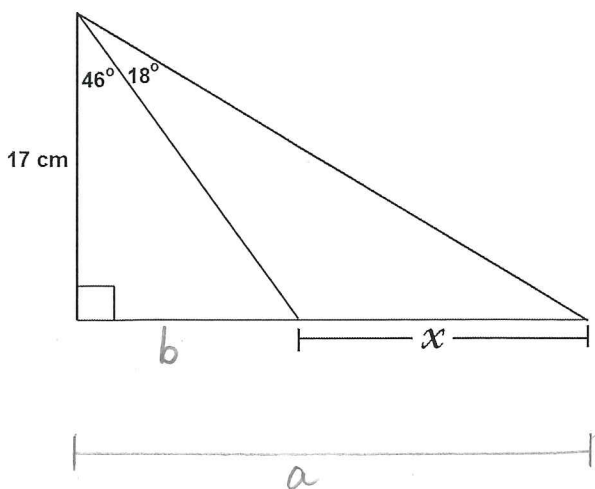
$$360 - 12 = 348^\circ$$

✓ ✓ -1 units

N 12° E

Question 4 (3 marks)

Calculate the value of the unknown side or angle in the following right-angled triangle. Round your answer to 1 decimal place.



$$\tan (46 + 18) = \frac{a}{17}$$

$$a = 34.85516531 \checkmark$$

$$\tan 46 = \frac{b}{17}$$

$$b = 17.60401533 \checkmark$$

$$a - b = x$$

$$34.855 - 17.604 = 17.25114998$$

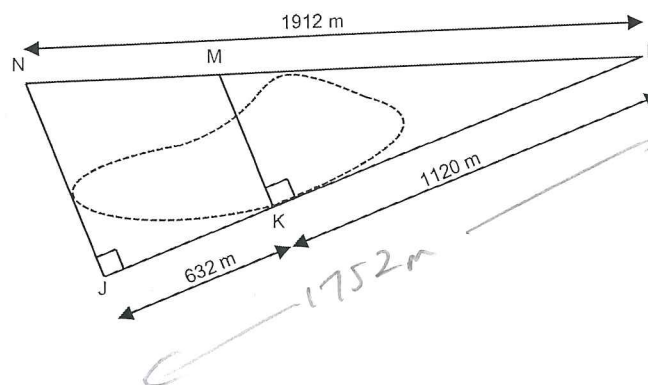
$$x = 17.3 \text{ cm (1dp)}$$

-1 unit

✓ (-1 roundly incorrect for Q)

Question 5 (4 marks: 2, 2)

The diagram above shows an area of forest bounded by roads JKL, JN and NML. It is known that $JK = 632$ m, $KL = 1120$ m, $NL = 1912$ m and that angles LJN and LKM are both 90° .



-1 units.

(a) Determine the length of road JN.

Pythag

$$1752^2 + x^2 = 1912^2$$

$$x = 765.66311$$

$$\approx 765.7 \text{ m (1dp)}$$

Either

$$\sin(23.6) = \frac{x}{1912}$$

$$x = 765.663$$

$$\approx 765.7 \text{ m (1dp)}$$

or

$$\tan(23.6) = \frac{x}{1752}$$

$$x = 765.663$$

$$\approx 765.7 \text{ m (1dp)}$$

(b) Use trigonometry to determine the size of angle JLN.

$$\cos \angle JLN = \frac{1752}{1912}$$

$$\angle JLN = 23.60640183$$

$$\approx 23.6^\circ \text{ (1dp)}$$

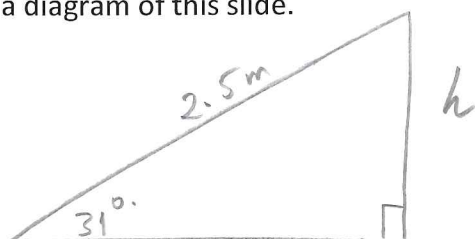
-1 units

Question 6 (7 marks: 1, 2, 1, 3)

A children's slide at the park can have a maximum angle of elevation of 31 degrees according to council regulations.

A 2.5 m slide is erected in a park with the maximum slope.

a) Draw a diagram of this slide.



✓ R/W labelled h 2.5 31°

b) Determine the height of the slide. Round your answer to 1 decimal place.

$$\sin 31 = \frac{h}{2.5}$$

$$h = 1.287595187$$

$$\approx 1.3 \text{ m}$$

IF $\tan 31 = \frac{h}{2.5}$

$$\tan 31 = \frac{h}{2.5}$$

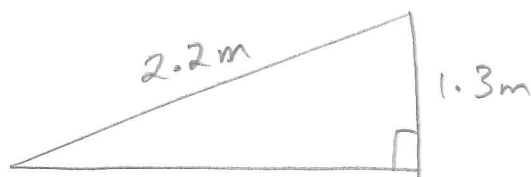
$$h = 4.2 \text{ m (1dp)}$$

-1 unit (overall)

-1 rounding.
for 2 Not overall.

The playground engineer wants to make a second slide. He wants it to be 1.3m high and 2.2m long.

c) Draw a diagram of this slide.



✓ 2/w must have
h 1.3m 2.2m
in correct
spots.

d) Does this second slide pass council regulations? Justify.

$$\sin \theta = \frac{1.3}{2.2}$$

$$\theta = 36.22154^\circ \checkmark$$

F.T diagram
error

✓
No.

angle of elevation $> 31^\circ \checkmark$ needs to compare
or 5.2° over the max. stake over size.
too large
too high.
exceed.

Question 5 (10 marks: 1, 2, 1, 2, 2, 2)

The Brown Taxi company charge a flag fall of \$3 and a rate of \$2 per kilometre travelled.

They use the formula: $F = 3 + 2d$, where d is the distance travelled in kilometres, to calculate the fare charged F (in dollars). For example, a taxi ride of 5 km would cost \$13.

(a) Matthew took a Brown Taxi from Perth to his home, a distance of 25 km. Calculate the fare Matthew was charged.

$$F = 3 + 2(25) \\ = \$53 \checkmark$$

-1 unit
overall.

(b) Peta is charged \$41 for catching a Brown Taxi home. What distance did she travel in the taxi?

$$41 = 3 + 2(x) \checkmark$$

$$x = 19 \text{ km.} \checkmark$$

-1 unit
overall

The Orange Taxi company charge a flag fall of \$6 and \$1.50 per kilometre travelled.

- (c) Write a formula for the fare charged by the Orange Taxi company in terms of d (the distance travelled).

$$F = 1.5d + 6$$

must
use d

$$\text{or } F = 6 + 1.5d$$

✓ R/W

- (d) Madeline is deciding whether to catch a Brown Taxi or Orange Taxi to her home. She wants to choose the cheaper company. She needs to travel 10 km. Which company should she choose? Justify your answer with calculations.

$$F_B = 3 + 2(10)$$

$$= \$23$$

$$F_O = 6 + 1.5(10)$$

$$= \$21$$

Would choose: ORANGE Taxi $\because 23 - 21 = \$2$ ✓
cheaper

- (e) Determine the distance travelled that will result in the fares for the Orange and Brown Taxis being equal.

$$1.5d + 6 = 3 + 2d \quad \checkmark$$

$$d = 6 \text{ km} \quad \checkmark$$

- 1 unit, overall.

- (f) Emily wants to give her mother some advice about which taxi company to choose so that her fare is always the cheapest. What advice should Emily give her mother?

$$d = 5 \text{ km}$$

$$\text{Brown} = 3 + 2(5)$$

$$= \$13$$

$$\text{Orange} = 6 + 1.5(5)$$

$$= \$13.5$$

$$d = 6 \text{ km}$$

same

$$d = 7 \text{ km}$$

$$\text{Brown} = 3 + 2(7)$$

$$= \$17$$

$$\text{Orange} = 6 + 1.5(7)$$

$$= \$16.5$$

when $d \leq 6$ then use Brown ✓
if $d > 6$ use Orange ✓

or $d < 6$ Brown
 $d \geq 6$ Orange