Student Name MARKING KEY

Eastern Goldfields College
Mathematics Applications 2017

Test 5 (U2 T2) – Calculator Free

Total Marks: 27 marks

Time allowed: 25 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) $y = 4 - 5x$

$m = -5$ ½ $y\ int = (0, 4)$ ½

b) $3y = 6x - 2$

$m = 2$ ✓ $y\ int = (0, -\frac{2}{3})$ ✓

c) $2x + 2y = 10$

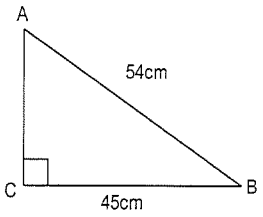
$m = -1$ $y\ int = (0, 5)$

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° ✓✓

Question 3 **(2 marks: 1, 1)**
Consider the triangle *ABC*.



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

$Sin\ LBAC = \frac{45}{54}$ ✓ $= \frac{5}{6}$

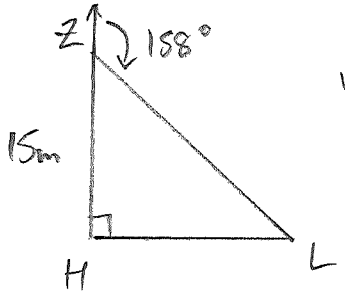
b) If the lengths of the sides of the triangle were all doubled in size, how would this effect the value of $sin \angle BAC$?

No effect ✓ or remains the same

ratio remains the same ie $\frac{90}{108} = \frac{5}{6}$

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.



✓ Labelled ZHL + 15m

✓ 158° + 90°

b) Calculate the distance between Harry and Liam. **Hint:** *tan22 = 0.4 (approximately)*

$Tan\ 22 = \frac{HL}{15}$ ✓

✓

$0.4 \times 15 = HL$

$HL = 6\ m$ ✓

Question 5 (11 marks: 1, 2, 1, 2, 2, 1, 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.

$F = 3 + 2(25)$
$= \$53$ ✓

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

$41 = 3 + 2d$ ✓
$38 = 2d$ $\quad d = 19\text{km}$ ✓

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).

$F = 1.5d + 6$ ✓

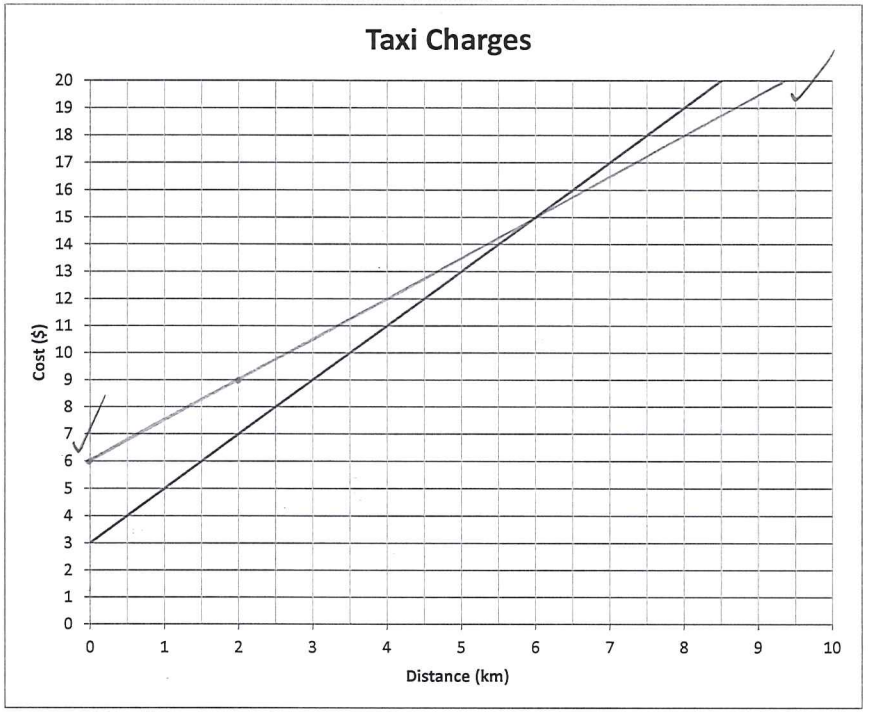
(d) Madeline is deciding whether to catch a Brown Taxi or Orange Taxi to her home. She wants to choose the cheaper company. She needs to travel 10 km. Which company should she choose? Justify your answer with calculations.

BROWN
$F = 3 + 2(10)$
$= \$23$

ORANGE
$F = 1.5(10) + 6$
$= \$21$

✓ ORANGE is cheaper by $2. ✓

(e) Brown taxi company has been plotted below. Add Orange taxi company charges to the graph below.



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

6 km cost $15 with each taxi company ✓

(g) 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?

If travelling < 6km use Brown
" " > 6km use Orange } ✓
If travelling 6km use either ✓

End of Non-Calculator Section

Student Name _____

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Mathematics Applications 2017

Test 5 (U2 T2) – Calculator Assumed

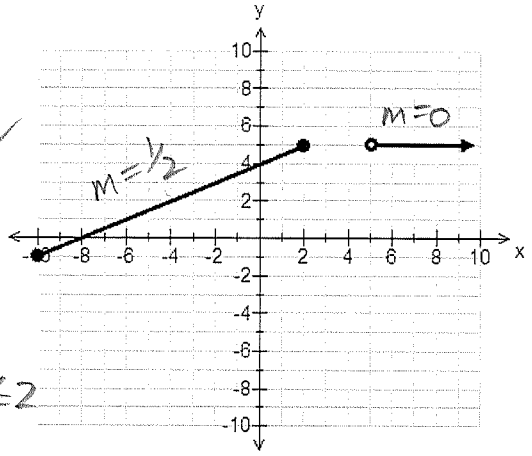
Total Marks: 32 marks

Time allowed: 35 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 $y = 5$?

$x > 5$ ✓ $x = 2$ ✓

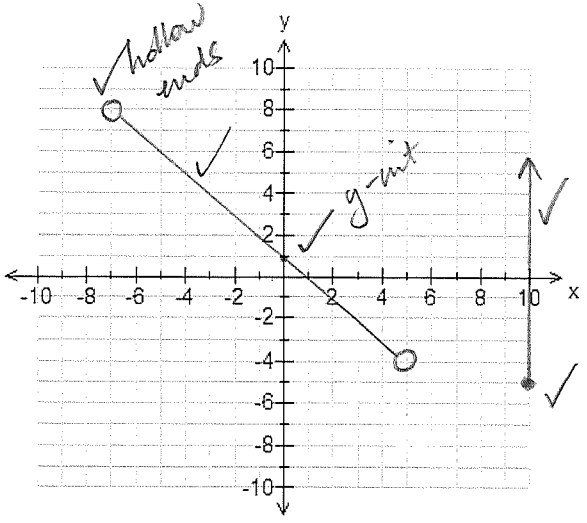
b) Label each of the gradients for each section of this graph.

c) Write functions to define the graph shown.

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

$y = 5 \quad x > 5$

Question 2 **(5 marks: 3, 2)**
Graph the following functions on the axes.

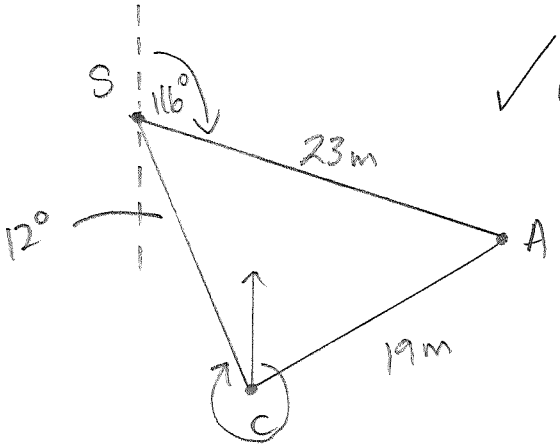


a) $y = -x + 1; \quad -7 < x < 5$

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

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 degrees 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 SAC + 23m + 19m

✓ AC reasonable placement

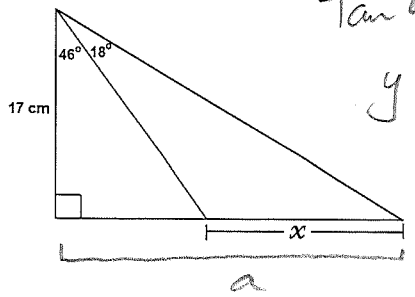
✓ 116° + 12° angles

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

$360 - 12 = 348°$ ✓ ✓

OR $(180 - 12 = 168 \quad 168 + 180 = 348)$

Question 4 **(3 marks)**
Calculate the value of the unknown side in the following right-angled triangle. Round your answer to 1 decimal place.



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

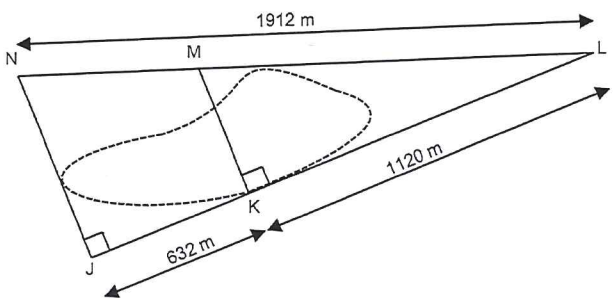
$y = 17.60401$ ✓

$\tan 64 = \frac{a}{17}$

$a = 34.85516$ ✓

$x = 34.85516 - 17.6 = 17.3$ cm ✓

Question 5 (4 marks: 2, 2)
The diagram below 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°.



(a) Determine the length of road JN. Round your answer to the nearest metre.

$JN^2 = 1912^2 - 1752^2$ ✓

$JN = 766\text{ m}$ ✓ (765.663)

other methods using angles.

(Don't use b) to get a))

(b) Determine the size of angle JLN. Round your answer to the nearest integer.

$\cos LJLN = \frac{1752}{1912}$ ✓

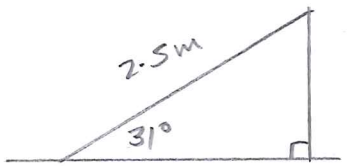
$LJLN = 24°$ (23.6)

✓

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

a) Draw a diagram of this slide.



½ 2.5m + 31°

½ h

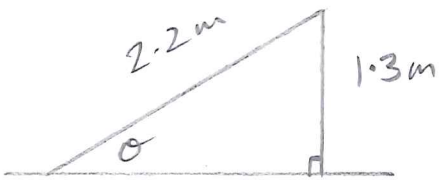
b) Determine the height of the slide. Round your answer to 1 decimal place.

$\sin 31 = \frac{h}{2.5}$ ✓

$h = 1.3\text{m}$ ✓ (1.28759)

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.



½ 2.2 + 1.3

½ h

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

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

$\theta = 36.2°$ (1dp) ✓

or too large

or exceeds regulations ✓

✓

No, angle of elevation is 5.2° greater than allowed.

End of Calculator Section