



# SeaHawk Tutors

Yr 11 Maths Paper 6 (45 minutes)

1. a is inversely proportional to the square root of b. When b is 5, a is 10. Find the value of a when b is 11. Give your answer to 3sf. [3]

$$\begin{aligned} a &\propto \frac{1}{\sqrt{b}} \quad a = \frac{k}{\sqrt{b}} \quad (M1) & a &= \frac{22.36}{\sqrt{b}} \\ k &= a\sqrt{b} & & = \frac{22.36}{\sqrt{11}} = \underline{6.74} \quad (A1) \\ &= 10\sqrt{5} \quad (M1) & & \end{aligned}$$

2.

- a. Dion is on holiday in Thailand. The exchange rate for the Thai Baht is £1 = THB 43.

- i. She buys a souvenir priced at THB 236.50. What is the price of the souvenir in pounds? [1]

$$\frac{236.50}{43} = \underline{£5.50} \quad (A1)$$

- ii. Her family has a budget of £120 to spend on food per day. They spent THB 1100 at breakfast and THB 1591 at lunch. What is the maximum that they can spend in Baht at dinner if they want to stick to their budget? [2]

$$\begin{aligned} 1100 + 1591 &= 2691 & \text{OR } 120 \times £20 &= 5160 \text{ THB} \\ \frac{2691}{43} &= \underline{£62.58} & 5160 - 1100 - 1591 & \quad (M1) \\ & & & = 2469 \\ 120 - 62.58 &= \underline{£57.42} \quad (M1) & & \\ 57.42 \times 43 &= \underline{\text{THB } 2469} \quad (A1) & & \end{aligned}$$

- b. Pencils are sold individually in store A at 75¢, or at store B in boxes of 5 for \$3.10. Store A has a 'buy 4, get 1 free' promotion. Hassan needs to buy 20 pencils. Is he better going to store A or store B? You must show your working. [2]

$$\begin{array}{l}
 B - 4 \times \text{box} = \$12.40 \\
 A - \text{Buy 16, get 4 free} = 20 \\
 16 \times \$0.75 = \$12.00
 \end{array}
 \left. \vphantom{\begin{array}{l} B \\ A \end{array}} \right\} \text{M1 for either}$$

Cheaper at A. (A1)

3. a. Expand and simplify:  $(2x - 1)(x + 2)(x - 3)$  [2]

$$\begin{aligned}
 (2x-1)(x+2) &= 2x^2 + 4x - x - 2 = 2x^2 + 3x - 2. \quad \text{M1} \\
 (2x^2 + 3x - 2)(x - 3) &= 2x^3 - 6x^2 + 3x^2 - 9x - 2x + 6 \\
 &= 2x^3 - 3x^2 - 11x + 6. \quad \text{(A1)}
 \end{aligned}$$

- b. Factorise:  $27abc + 9bc$  [1]

$$\cancel{9b(27ac)} \quad 9bc(27a + 1)$$

- c. Solve the simultaneous equations  $5x + 3y = 5$  and  $3x - 2y = 22$ . [3]

$$\begin{array}{r}
 10x + 6y = 10 \\
 9x - 6y = 66
 \end{array}
 + \left( \text{M1} \right) \text{oa}$$


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$$\begin{array}{r}
 19x = 76 \\
 x = 4
 \end{array}$$

$$\begin{array}{r}
 3x - 2y = 22 \\
 12 - 2y = 22 \quad \text{(M1) oa} \\
 2y = -10 \quad y = -5
 \end{array}$$

$$\underline{x = 4 \quad y = -5} \quad \text{(A1)}$$

4. Show that

$$\frac{2x^2 + x - 15}{x^2 - 9}$$

can be written as  $\frac{ax + b}{x + c}$

where  $a$ ,  $b$  and  $c$  are integers to be found.

[3]

$$\begin{aligned}
 & 2x^2 + x - 15 \quad \begin{array}{r} -30 \\ +6x-5 \end{array} \\
 & = 2x^2 + 6x - 5x - 15 \\
 & = 2x(x+3) - 5(x+3) \\
 & = (2x-5)(x+3) \quad \text{(M1)} \\
 & \frac{2x^2 + x - 15}{x^2 - 9} = \frac{(2x-5)(x+3)}{(x+3)(x-3)} \quad \text{(DoTS)} \\
 & = \frac{2x-5}{x-3} \quad \text{(AC)} \\
 & \underline{a=2 \quad b=-5 \quad c=-3}
 \end{aligned}$$

5. An arithmetic sequence starts:  $a$ ,  $b$ , 21, 25, 29, 33.

a. What are the values of  $a$  and  $b$ ?

[1]

$$13, 17$$

b. Find an expression for the  $n$ th term of this sequence

[2]

$$4n + 9 \quad \text{M1 for either } 4n \text{ or } +9$$

c. What is the 20th term of the sequence?

[1]

$$4(20) + 9 = 89$$

d. Is 201 a term in the sequence? Explain your answer.

[1]

$$\begin{aligned}
 201 &= 4n + 9 & 4n &= 192 \\
 & & n &= 48
 \end{aligned}$$

$n$  is an integer  $\Rightarrow$  YES

6.  $f(x) = 2x + 3$

a. Find  $f(-5)$

[1]

$$2(-5) + 3 = -7$$

b. Find  $a$  given that  $f(a) = 8$

[2]

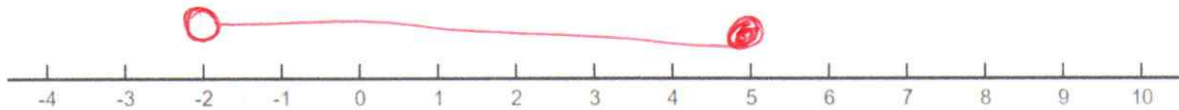
$$8 = 2a + 3 \quad \text{M1}$$

$$5 = 2a \quad a = 2.5 \quad \text{A1}$$

7. Solve the inequality and draw it on the number line:  $-8 < c^3 \leq 125$

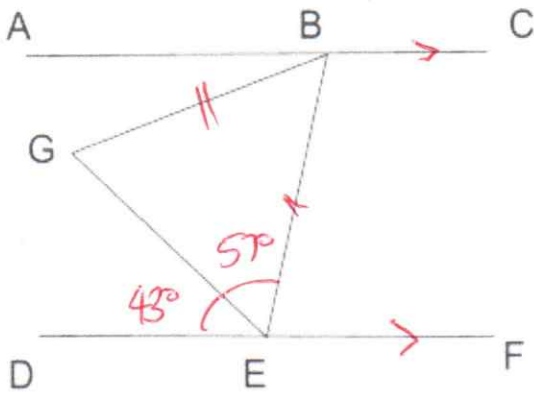
$$\sqrt[3]{-8} < c \leq \sqrt[3]{125}$$

$$-2 < c \leq 5$$



[3]

8. ABC and DEF are parallel lines.



$$BG = BE$$

$$\text{Angle DEG} = 43^\circ$$

$$\text{Angle GEB} = 57^\circ$$

$$BGE = 57^\circ \quad (\text{Isosceles})$$

$$GEB = 66^\circ \quad (\text{Triangle} = 180^\circ)$$

$$ABE = 180 - (43 + 57) = 80^\circ$$

(Corresponding)

$$ABG = 80 - 66 = 14^\circ$$

M2  
for  
any  
2

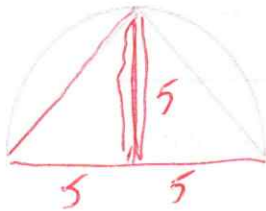
A1

Find the size of angle ABG. Explain your reasoning at each step.

[3]

9. The diagram shows a symmetrical shape made by drawing a line from the ends of a semicircle of radius 5cm to the midpoint of its arc.

Calculate the perimeter of the shape. Give your answer to 1 decimal place.



$$\text{Arc length} = \frac{\pi d}{2} = \frac{10\pi}{2} = 5\pi \quad \text{(M1)} \quad \text{(M1)}$$

$$\text{Line length} = \sqrt{5^2 + 5^2} = \sqrt{50} \quad \text{(M1)}$$

$$\begin{aligned} \text{Perimeter} &= 5\pi + 2 \times \sqrt{50} \quad \text{(M1)} \\ &= \underline{29.9 \text{ cm}} \quad \text{(A1)} \end{aligned}$$

[5]



10. A bag contains 250 beads of various colours. A single bead is picked at random from the bag. The table shows the probability of the selected bead being a given colour.

Blue	Red	Green	Yellow
0.42	0.34	0.12	0.12

(A1)

The probability of picking a green bead is equal to the probability of picking a yellow bead.

- a. Complete the table

$$0.42 + 0.34 = 0.76 \text{ (M1) for either}$$

[2]

- b. How many red beads are there in the bag?

$$1 - 0.76 = 0.24 \quad 0.24 \div 2 = 0.12$$

[1]

$$0.42 \times 250 = 105$$

- c. A bead is picked at random and replaced in the bag, then a second bead is picked. Calculate the probability that two blue beads are picked.

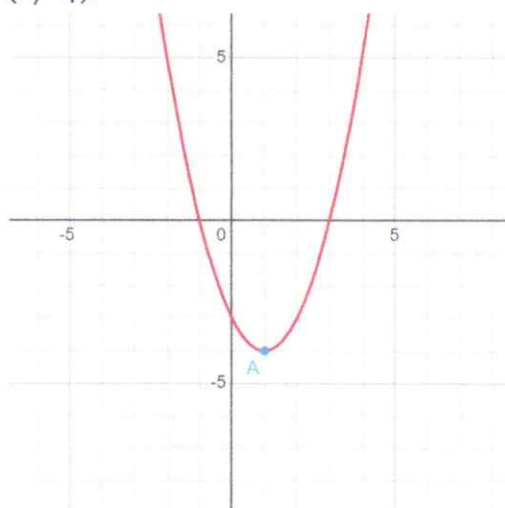
[2]

$$0.42 \times 0.42 = 0.1764 \text{ oe}$$

(M1)

(A1)

11. The diagram shows the graph of  $y = f(x)$ . The function has a minimum at the point A, (1, -4).



Write down the coordinates of the minimum point on the graph of the functions:

- a.  $y = f(x-5)$

$$(6, -4)$$

[2]

- b.  $y = f(x) - 5$

$$(1, -9)$$

[1]