GCSE (9-1) Mathematics

J560/06 Paper 6 (Higher Tier)

Question Set 1

1 **(a)** A grain of salt weighs 6.48×10^{-5} kg on average.
A packet contains 0.35 kg of salt.

(a) Use this information to calculate the number of grains of salt in the packet.

(a) ..... **[2]**

(b) **(b)** Explain why your answer to part **(a)** is unlikely to be the actual number of grains of salt in the packet.

.....

.....

..... **[1]**

2 Sophie is organising a raffle.

- Each raffle ticket costs 50p.
- She sells 400 tickets.
- The probability that a ticket, chosen at random, wins a prize is 0.1.
- Each winning ticket receives a prize worth £3.

Sophie says

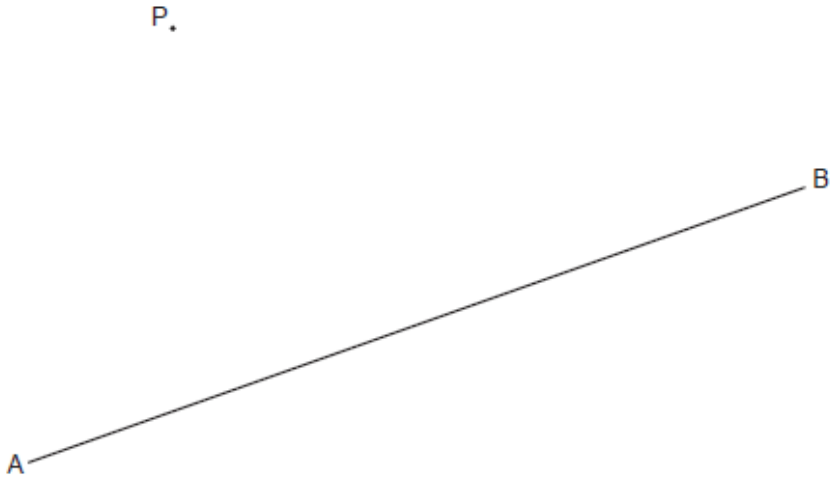
I expect the raffle to make over £100 profit.

Show that Sophie is wrong.

.....

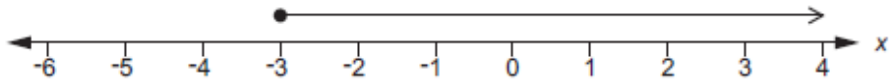
..... **[4]**

3 Construct the perpendicular from the point P to the line AB.
Show all of your construction lines.



[2]

4 Martha's solution to the inequality $8x + 5 \leqslant 3x - 10$ is shown on the number line.



Is her solution correct?
Explain your reasoning.

.....

..... **[4]**

5 In 2017, the value of a house increased by 4%.
In 2018, the value of the house then decreased by 3%.

Teresa says

Over the two years the value of the house increased by exactly 1% because 4 – 3 = 1.

Show that Teresa is wrong.

.....

..... **[6]**

6 **(a)** Antonio rolls two fair six-sided dice and calculates the **difference** between the scores.
For example, if the two scores are 2 and 5 or 5 and 2 then the difference is 3.

(a) Complete the sample space diagram to show the possible outcomes from Antonio's dice.

Dice 2

Dice 1	1	2	3	4	5	6
1	0					
2					3	
3		1				
4						
5		3				
6						

[2]

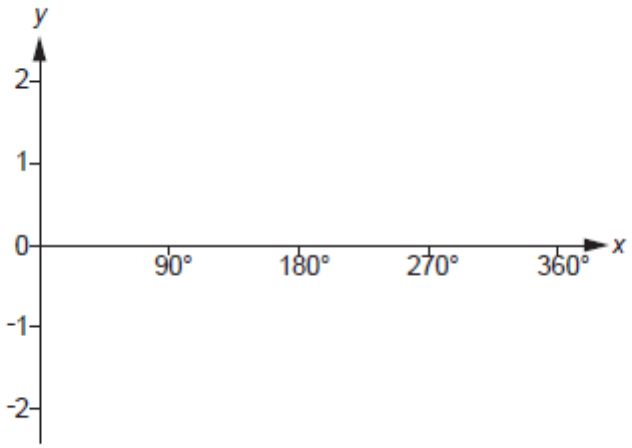
(b) **(b)** Antonio rolls the two dice three times.

Calculate the probability that he gets a difference of 1 on all three rolls.
Give your answer as a fraction in its lowest terms.

(b) ..... **[4]**

7 Prove that the mean of any four **consecutive** even integers is an integer. **[4]**

8 Sketch the graph of $y = -\sin x$ for $0° \leqslant x \leqslant 360°$.

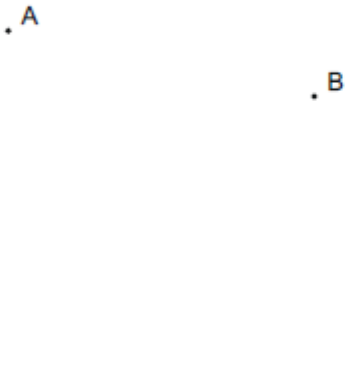


[3]

9 (a) T is a radar tower.
A and B are two aircraft.

At 3pm
- aircraft A is 3250 km from T on a bearing of 015°
- aircraft B is 4960 km from T on a bearing of 057°.

Not to scale



(a) Aircraft A flies directly towards radar tower T at a speed of 890 km/h.

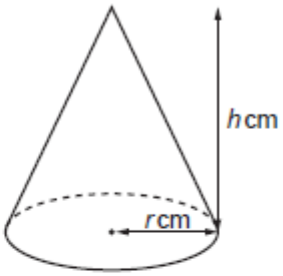
At what time will the aircraft pass over radar tower T?
Give your answer to the nearest minute.

(a) ..... **[4]**

(b) Calculate the distance that was between aircraft A and aircraft B at 3pm.

(b) ..... km **[4]**

10 A cone has radius r cm and height h cm.



The height is three times the radius.
The volume of the cone is $2100\,\text{cm}^3$.

Calculate the radius of the cone.

[The volume V of a cone with radius r and height h is $V = \frac{1}{3}\pi r^2 h$.]

..... cm **[4]**

11 (a) The point (-5, 2) lies on the circumference of a circle, centre (0, 0).

(a) Find the equation of the circle.

(a) ..... **[4]**

(b) **(b)** Work out the gradient of the tangent to the circle at (-5, 2).

(b) ..... **[2]**

Total Marks for Question Set 1: 50