

1. Two fair 6-sided dice, one blue and one yellow, are thrown. For each die, the faces are labelled 1, 2, 3, 4, 5, 6. The score for each die is the number which lands face up.

(a) List the pairs of scores that give a sum of 4. (3 marks)

(b) The probability distribution for the sum of the scores on the two dice is shown below. (3 marks)

Sum	2	3	4	5	6	7	8	9	10	11	12
Prob	1/36	a	3/36	4/36	b	7/36	5/36	c	3/36	2/36	1/36

Find the value of a, b, and c.

Mark scheme:

(a) (1, 3), (2, 2), (3, 1) (A1)(A1)(A1)

(b) $a = \frac{2}{36}$ (A1)

$b = \frac{5}{36}$ (A1)

$c = \frac{4}{36}$ (A1)

2. Students in a Biology class were studying the growth rate of E. coli. They observed the growth of the E. coli over a 10 hour period and collected data at the end of each hour. They modeled the function $E = 82(1.0856)^t$, $t \geq 0$, where t is the number of hours since the start of the observation.

(a) Find the population of E. coli (3 marks)
 i. At the start of the observation
 ii. After 6 hours

(b) Calculate the time for the population to increase above 160. (2 marks)

(2 marks)



(c) How many hours would it take to triple the amount of E. coli?

Mark scheme:

(c) i. 82 (A1)

ii. $E = 82(1.0856)^6$ (M1)

$E = 134.225$
 $E = 134$ (A1)

(d) $160 = 82(1.0856)^t$ (M1)

Solving by graphing or use of logs. (A1)
 $t = 8.14$ hours

(e) $246 = 82(1.0856)^t$ (M1)

Solving by graphing or use of logs. (A1)
 $t = 13.4$ hours