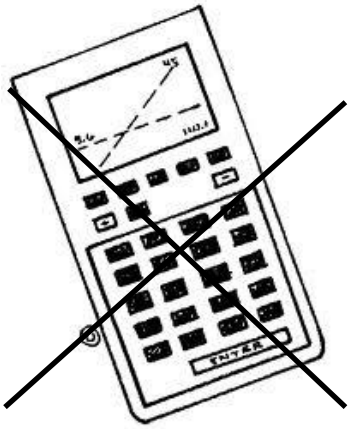
école européenne de strasbourg	**Date**	**13/12/2021**
	Class	**S6 EN**
	Subject	**MATHEMATICS** PART A
	Duration	**90 Minutes**
	Teacher	**D. Shaw**

NAME:	**First Name:**	
Marks	***Comments***	***Signature***
/70		

Exam Without Calculator



Instructions

- *This exam consists of 7 questions on 10 pages including this cover page.*
- *All questions are compulsory.*
- *Answer directly on the question paper.*
- *Any attempt at cheating will result in the immediate cancellation of your exam.*
- *Read all the questions calmly and thoroughly and show all workings clearly.*

Good Luck!

Question 1: **[10 Marks]**

In a box of 4 matches one is shorter than the others. Four players pick a match one after the other. Whoever picks the short match loses.

/4

a) Show, with the aid of a tree diagram the probabilities of each player getting the short match.

/4

a) Give the following probabilities:
   - The first player loses:
   - The second player loses:
   - The third player loses:
   - The fourth player loses:

/2

b) Does it have an effect on the outcome whether you are the first to choose the match or the last?

Question 2: **[9 Marks]**

In a box of chocolates, we find 24 different chocolates. 18 chocolates are made from milk chocolate and 6 are made from white chocolate. Two thirds of the milk chocolates have a marzipan filling. In total there are 16 chocolates with a marzipan filling in the box.

a) Complete the following two-way table. /5

	Milk chocolate	White chocolate	Total
with marzipan			
Without marzipan			
Total			

b) If a chocolate is picked at random from the full box, calculate the probability that it would be a white chocolate one without a marzipan filling. /2

c) Given that a chocolate chosen at random from the full box is a white chocolate, calculate the probability that it has a marzipan filling. /2

Question 3: **[12 Points]**

Solve the following equations:

a) $3(x-2)=6$ /2

b) $-5x+3=2x+10$ /2

c) $4=-2(x+3)$ /2

d) $1 = 3(x - 2) + 3 - 2x$	/2
e) $x^2 - 2x - 3 = 0$	/2
f) $x^2 - 4x + 4 = 0$	/2

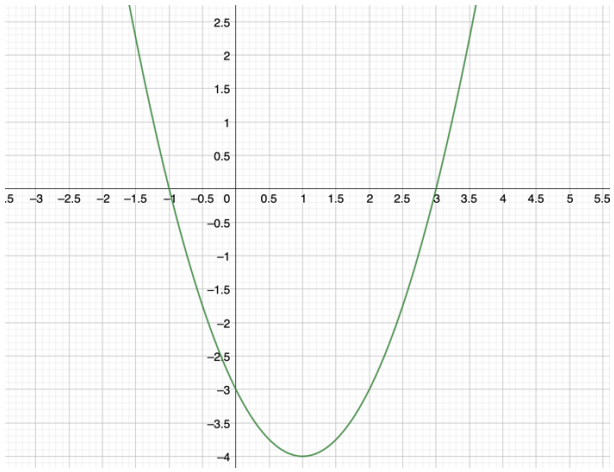
Question 4: [8 Points]

Match each of the following functions to their corresponding graph.

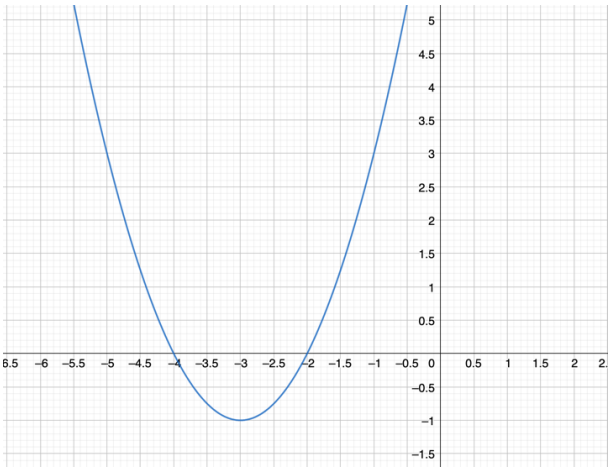
/8

Function	Graph
$A(x) = -2x^2 + 3x + 3$	
$B(x) = (x - 3)(x + 1)$	
$C(x) = -2(x + 4)^2 + 5$	
$D(x) = (x + 3)^2 - 1$	

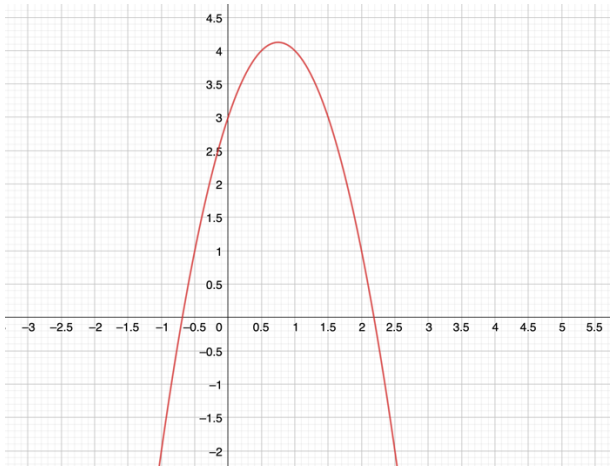
a)



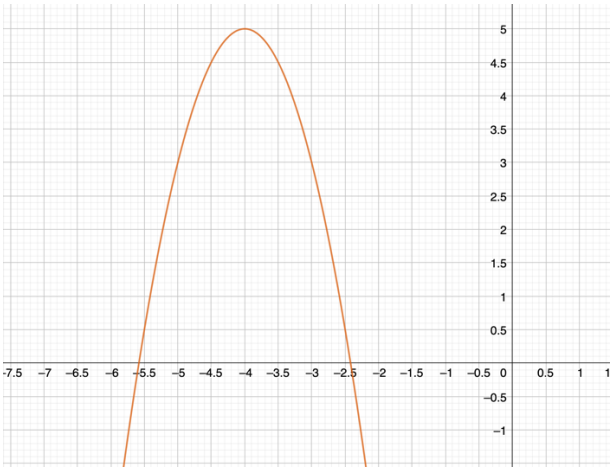
b)



c)

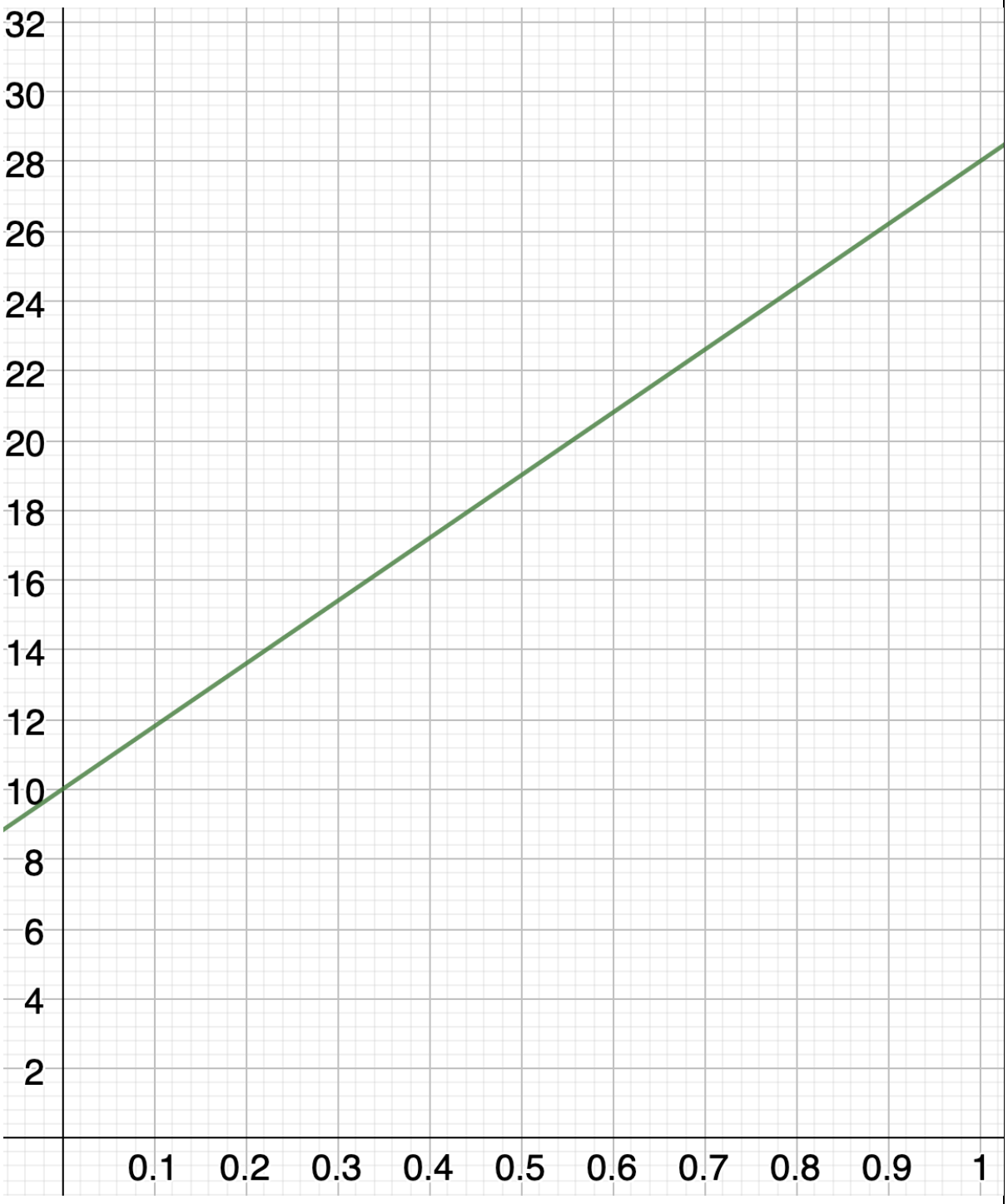


d)



Question 5: **[9 Points]**

Helen is taking part in a cycling race. She has already cycled 10km and is advancing at a constant speed. The following graph represents the distance travelled as a function of the time in hours.



a) Identify the distance travelled at the origin (of the graph) and the slope of the line. At what speed is Helen travelling? **/4**

b) Formulate an equation for the distance, d (in km) that Helen cycles as a function of time, t (in h) since she passed the 10km mark. **/2**

/3

c) How many kilometres will Helen have cycled, 90 minutes after passing the 10km mark?

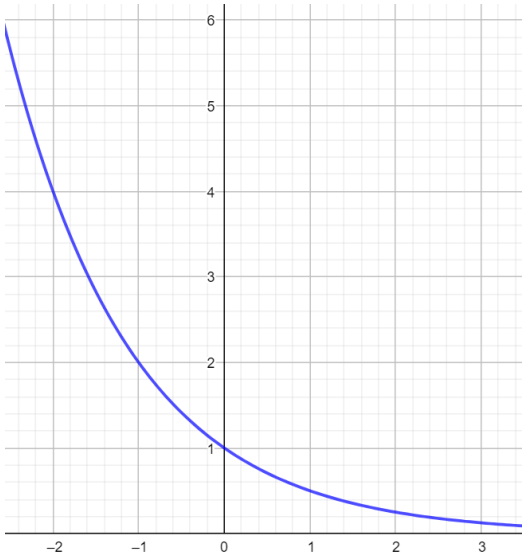
Question 6: [8 Marks]

Match each of the following functions to their corresponding graph.

/8

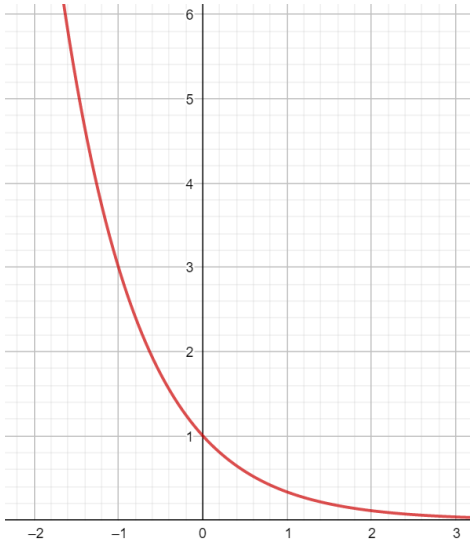
Function	Graph
$f(x) = 2^{2x} + 3$	
$g(x) = 3^{-x}$	
$h(x) = 0.5^{x}$	
$q(x) = 2^{x}$	

a)

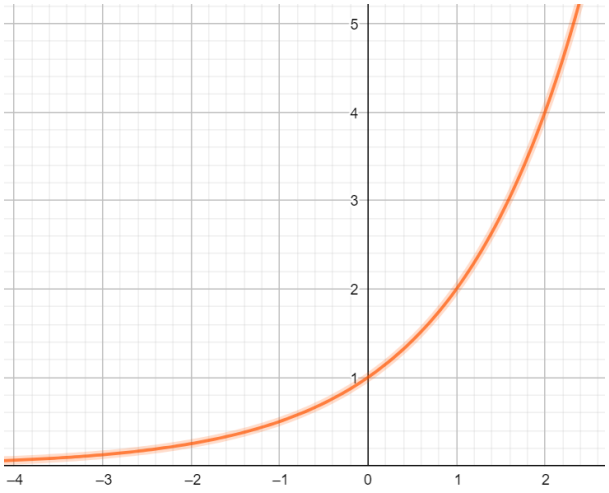


b)

c)



d)



Question 7: **[14 Marks]**

The following image is a graphic representation of the function

$$f(x) = 2^{3x+1} + 2.$$

a) State the domain of the function. /2

b) State the range of the function. /2

c) Find the y-intercept. /2

d) What are the roots of the function? /2

e) Estimate the following values: /6

i) $f(0.2) =$

ii) $f(-2) =$

iii) $if\ f(x) = 3, \quad x =$