SCORE A

Algebra

With Classified answer book

8

Eng. Magda El-Labban

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21- Direct and Inverse Proportion

1. It takes 5 workers 300 minutes to decorate some cakes.

   Find how many minutes it would take 12 workers to decorate the same number of cakes.

..... minutes

2. Six equations are shown below, each labelled with a letter.

A	B	C
$y = -6x$	$x = \frac{1}{6}y$	$y = \frac{-3}{x}$

D	E	F
$x = \frac{6}{y}$	$y = 6x$	$y = \frac{2}{x} + 2$

Choose the correct letters to make this statement true.

Equation ..... and equation ..... each show x is inversely proportional to y.

3. The weight of a piece of wire is directly proportional to its length.

A piece of wire is 24 cm long and has a weight of 6 grams.

Another piece of the same wire is 28 cm long.

Calculate the weight of the 28 cm piece of wire.

..... grams

4. In a spring, the tension (T newtons) is directly proportional to its extension (x cm).

When the tension is 150 newtons, the extension is 6 cm.

Find a formula for T in terms of x.

T = ...

5. It takes 2 people 6 days to build a wall.

There is one person.
How long does it take them to build the wall?

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22- Inverse Function

1. Jess runs from her house to the bus stop in 60 seconds.

   i Jess runs twice as fast. How long does it take her to run from her house to the bus stop?

   ii Jess runs half as fast. How long does it take her to run from her house to the bus stop?

2. Write down the inverse of this function.

   f is the function such that $f(x) = 3 - 2x$

   $y =$ .....

3. Write down the inverse of this function.

   $f(x) = 6x + 1$

   $y =$ .....

4. Write down the inverse of this function.

   $y = 2x$

   $y =$ .....

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5. In this question, consider only positive values of x

Look at this function.

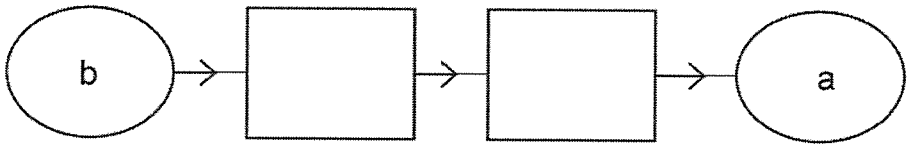
$p = 3x$	As x increases, p increases.

For each function below, tick (✓) the correct box.

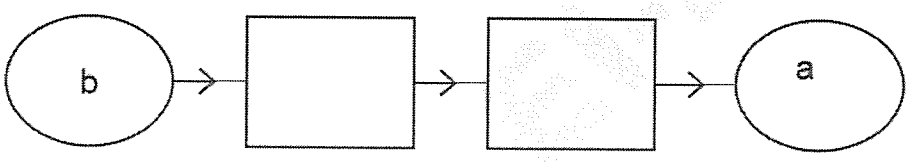
$q = x - 2$	As x increases,	☐	q increases	☐ q decreases
$r = \frac{1}{2}x$	As x increases,	☐	r increases	☐ r decreases
$s = 2 - x$	As x increases,	☐	s increases	☐ s decreases
$t = \frac{1}{x}$	As x increases,	☐	t increases	☐ t decreases

23- Function Machines

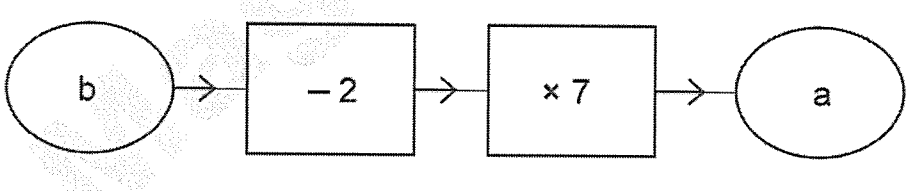
1 a. Complete the number machine so that $a = 2b - 6$



(b) Complete the number machine so that $a = \frac{2 + b}{3}$



(c) Look at the function machine shown below.



Write down the output a, in terms of b.

Answer _____

2. Look at the information. $x = 4$ $y = 13$

Complete the rules below to show **different** ways to get y using x

The first one is done for you.

To get y, **multiply** x by 2 and **add** 5

This can be written as $y = 2x + 5$

To get y, multiply x by _____ and add _____

This can be written as $y =$ _____

To get y, **multiply** x by _____ and **subtract** _____

This can be written as $y =$ _____

To get y, **divide** x by _____ and **add** _____

This can be written as $y =$ _____

3. Complete the table of values for each function machine.

i

$x \longrightarrow \square^2 \longrightarrow y$

x	0	1	2	3
y				

ii

$x \longrightarrow \square^3 \longrightarrow y$

x	0	1	2
y			

4. a. Complete the table of values for each two-step function machine.

$x \longrightarrow \square^2 \longrightarrow +3 \longrightarrow y$

x	2	5	9	11
y				

b. Write each function in part a as an equation.

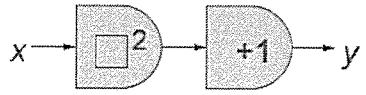
5. a. Complete the table of values for each two-step function machine.

x	1	3	5	10
y				

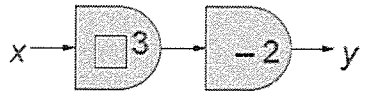
b. Write each function in part a as an equation.

6. Copy and complete the table of values for each two-step function machine.

Use the working to help you.

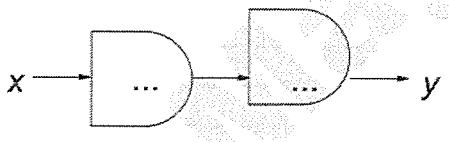
i. 

x	3	6	8
y	10		

ii. 

x	1	3	10
y	−1		

7. look at this function machine and table of values.



x	−2	3	5
y	16	36	100

I think the equation for this function is $y = 4x^2$

I think the equation for this function is $y = (2x)^2$.

Is either of them correct? Explain your answer. Show all your working.

8. For the following function machine

i. write the equation

ii. work out the reverse equation

The first one has been done for you

$x \longrightarrow \square^2 \longrightarrow -6 \longrightarrow y \rightarrow$ equation is $y = x^2 - 6$

$x \longleftarrow \pm\sqrt{\square} \longleftarrow +6 \longleftarrow y \rightarrow$ equation is $x = \pm\sqrt{y+6}$

$x \longrightarrow \square^2 \longrightarrow y$

the equation

the reverse equation

$x \longrightarrow \square^3 \longrightarrow y$

the equation

the reverse equation

$x \longrightarrow -4 \longrightarrow \square^2 \longrightarrow y$

the equation

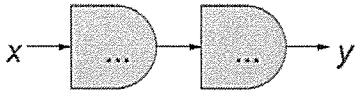
the reverse equation

$x \longrightarrow \times 2 \longrightarrow \square^3 \longrightarrow y$

the equation

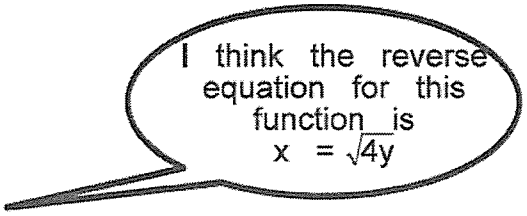
the reverse equation

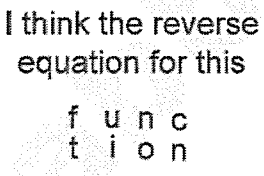
9. Sofia and Zara are looking at this function machine and table of values.



x	4	8	10
y	4	16	25

This is what Sofia and Zara say:

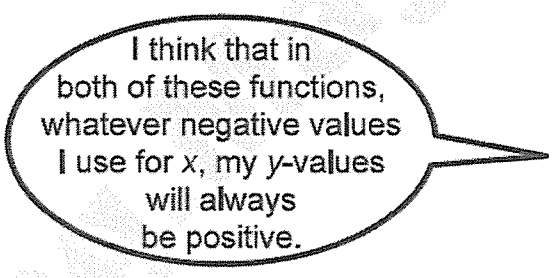




Is either of them correct? Explain your answer. Show all your working.

10. Oliver is looking at the two functions $y = (x - 1)^4$ and $y = 5 + x^2$.

He makes this conjecture.



Is oliver correct? Show working to justify your answer.

11. The membership cost at a fitness club is a joining fee of $20 plus $15 per week.

a. Show that the total cost for 4 weeks is $80.

b. Find the total cost for 10 weeks.

c. The total cost for *w* weeks is *y* dollars. Write a function for *y*.

12. a. The membership cost at a fitness club is a joining fee of $20 plus $10 per week.

The total cost for *w* weeks is *y* dollars. Write a function for *y*.

b. At a gym, A run lifts 2 kg and 4 kg weights.
A run lifts *x* 2 kg weights and *y* 4 kg weights. The total mass is 22 kg.
Write a function to show this.

13. Alicia is n years old and Barak is m years old. The total of their ages is 30 years.

a. Write a function to show this.

b. Alicia is 13. Work out Barak's age.

c. Barak is 3 times Alicia's age. Write a function to show this.

14. A small taxi can take 4 passengers. A large taxi can take 6 passengers.
small taxis and / large taxis can take 40 passengers.

i. Write a function to show this.

ii. There are 7 small taxis. Work out the number of large taxis.

15. Fatima buys some pens and pencils. Pencils cost $2 and pens cost $6.
Fatima spends $30. Suppose Fatima buys c pencils and k pens.
Write a function to show what she spends.

16. The cost of hiring a ladder is a fixed charge of $10 plus $3 per day.
Explain why $y = 3x + 10$ where x is the number of days' hire
and y is the total cost in dollars.

17. The cost of hiring a chainsaw is a fixed charge of $15 plus $10 per day.

If t is the total cost in dollars for n days, write a function to show the cost

18. A boy's mass is 3 kg less than twice his sister's mass.

If the boy's mass is b kg and his sister's mass is g kg,
write a function to show the relationship between b and g.

19. Shen is s years old and his father is f years old.
The total age of Shen and his father is 50.

a. Write a function to show this.

b. Write a function to show the relation between their ages after one year.

c. Write a function to show the relation between their ages after 5 years.

20. Kasia has some $5 notes and $10 notes. She has a total of $90.

a. Show that she could have 6 notes of each type.

b. Suppose Kasia has f $5 notes and t $10 notes.

Write a function to show that she has $90.

c. What is the largest number of $10 notes Kasia could have?

21. There are two types of sofa in a lounge. *x* sofas have 3 seats and *y* sofas have 2 seats.
There is a total of 50 seats.

Write a function to show this.

22. The function $y = (x - 3)2$ can be represented by this function machine.

Input (x) → [−3] → [Square] → Output (y)

(a) Find the output if the input is −1

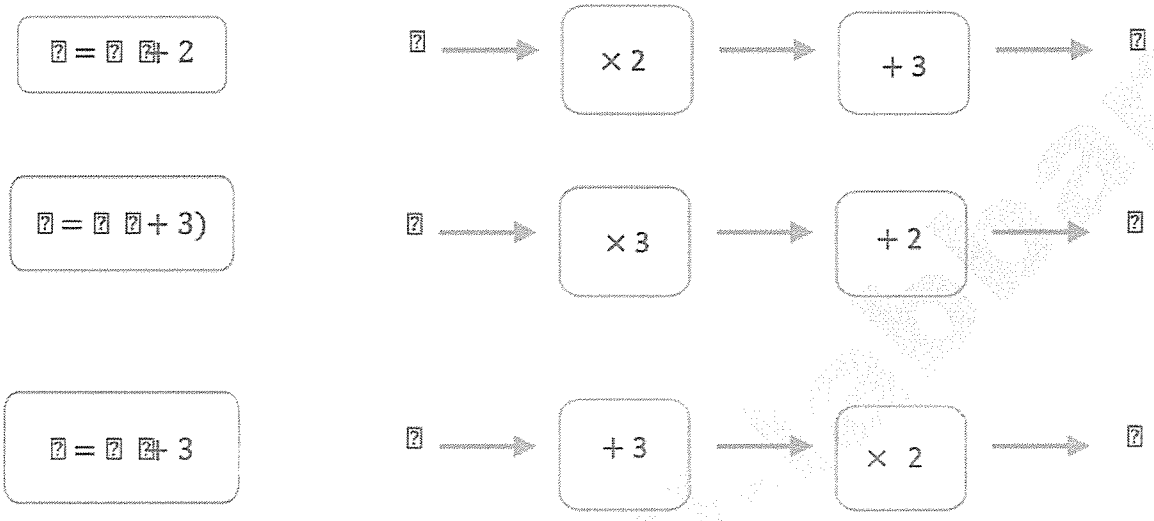
.....

(b) Find the **two** inputs that give an output of 9

.....

.....

23. Match each equation to its correct function machine.



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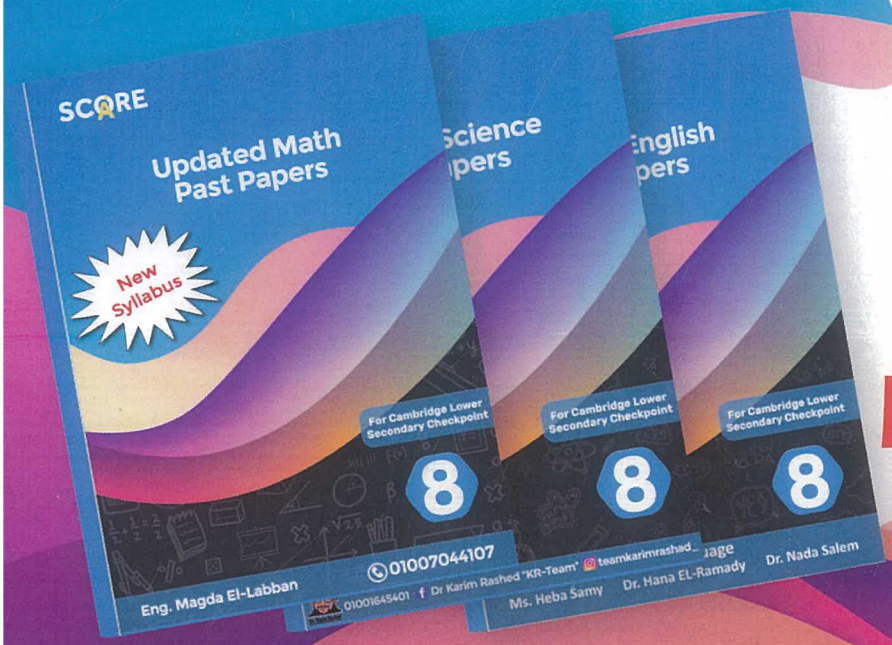

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