

# Stress test - topic 1 and 3

1a. [3 marks]

A group of 60 sports enthusiasts visited the PyeongChang 2018 Winter Olympic games to watch a variety of sporting events.

The most popular sports were snowboarding ( $S$ ), figure skating ( $F$ ) and ice hockey ( $H$ ).

For this group of 60 people:

4 did not watch any of the most popular sports,

$x$  watched all three of the most popular sports,

9 watched snowboarding only,

11 watched figure skating only,

15 watched ice hockey only,

7 watched snowboarding and figure skating,

13 watched figure skating and ice hockey,

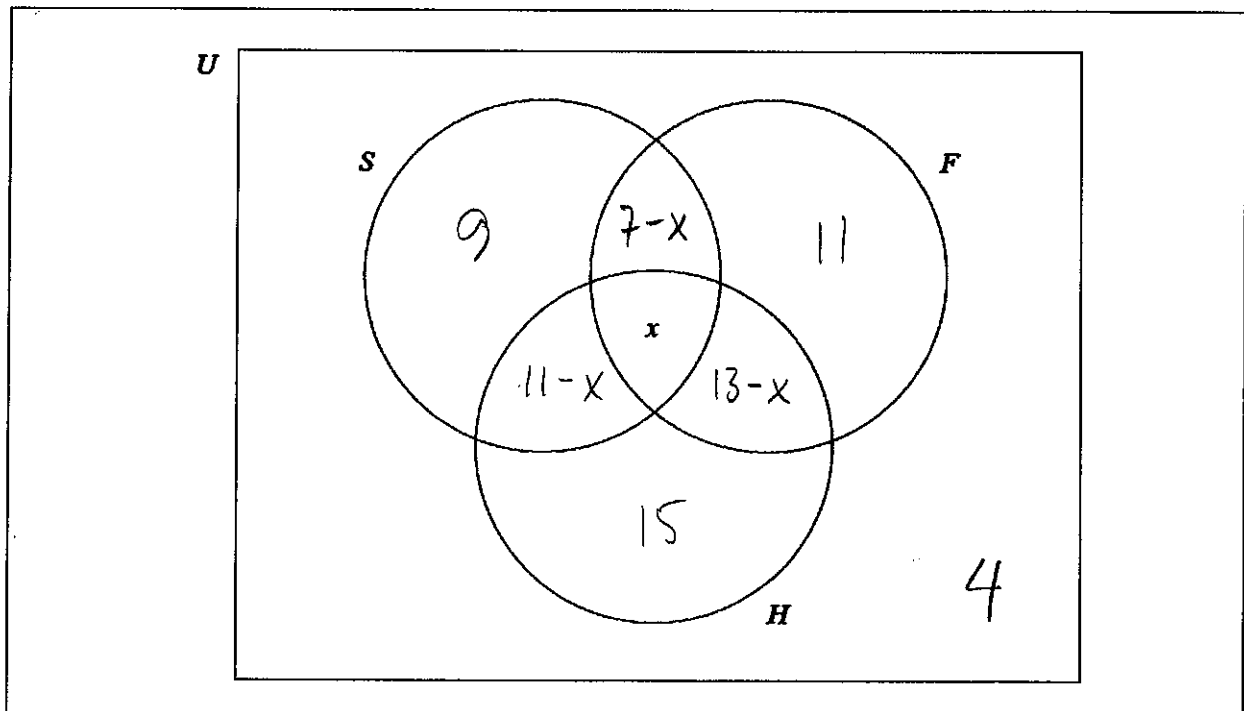
11 watched snowboarding and ice hockey.

A1

A1

A1

Complete the Venn diagram using the given information.



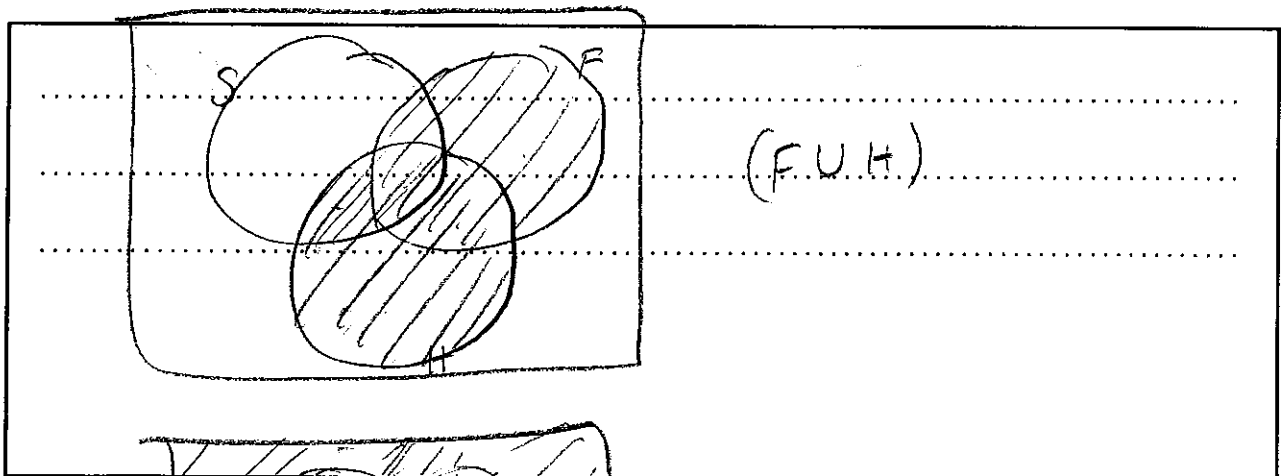
1b. [2 marks]

Find the value of  $x$ .

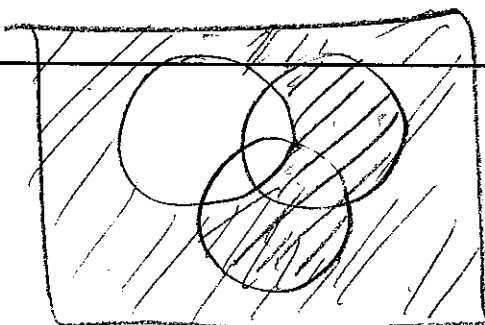
$$4 + 9 + 11 + 15 + x + (7 - x) + (11 - x) + (13 - x) = 60$$
$$70 - 2x = 60$$
$$10 = 2x$$
$$x = 5$$

1c. [1 mark]

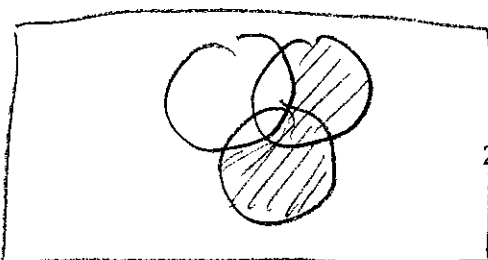
Write down the value of  $n((F \cup H) \cap S')$ .



$(F \cup H)$



$S'$

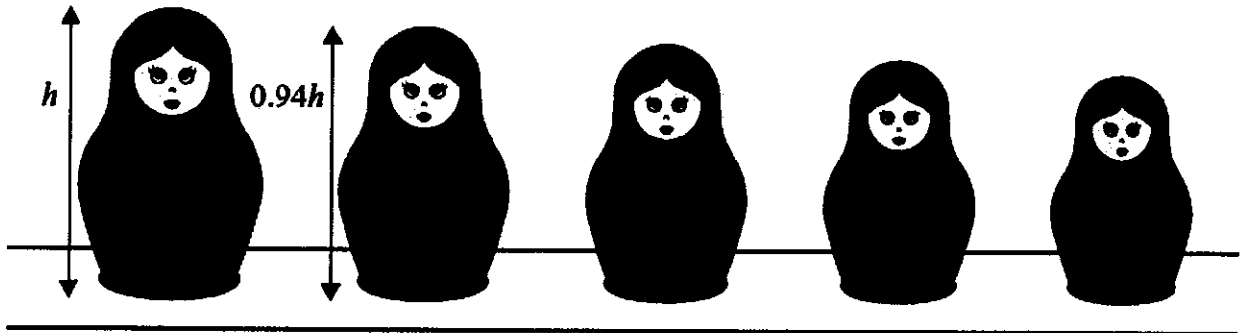


$$(F \cup H) \cap S' = 11 + 8 + 15 = \boxed{34}$$

2a. [3 marks]

Matryoshka dolls, or Russian dolls, are similarly designed dolls which open up and fit inside each other.

The largest set of these type of dolls is a 51 piece set which was completed in 2003. The height of the largest piece in this set is 54 cm. The heights of successive smaller dolls are 94 % of the preceding larger doll, as shown.



Find the height of the smallest doll in this set.

Geometric sequence  $u_n = u_1 r^{n-1} \Rightarrow$   
 $u_{51} = 54 \times 0.94^{50} = 2.45 \text{ cm}$

2b. [3 marks]

Find the **total** height if all 51 dolls were placed one on top of another.

$$S_n = \frac{a_1(1-r^n)}{1-r}$$
$$S_{51} = \frac{54(1-0.94^{51})}{1-0.94} = 862 \text{ cm}$$

3a. [3 marks]

Consider the following propositions.

$p$  : the baby cries

$q$  : the baby is happy

$r$  : the baby wants to play

Write down, in words,  $(q \wedge r) \Rightarrow \neg p$ .

If the baby is happy and wants to play then the baby does not cry.

3b. [2 marks]

Complete the following truth table.

$p$	$q$	$r$	$\neg p$	$(q \wedge r)$	$(q \wedge r) \Rightarrow \neg p$
T	T	T	F	T	F
T	T	F	F	F	T
T	F	T	F	F	T
T	F	F	F	F	T
F	T	T	T	T	T
F	T	F	T	F	T
F	F	T	T	F	T
F	F	F	T	F	T

3c. [1 mark]

State whether  $(q \wedge r) \Rightarrow \neg p$  is a tautology, contradiction or neither.

Neither
.....
.....
.....

4a. [1 mark]

In an international competition, participants can answer questions in **only one** of the three following languages: Portuguese, Mandarin or Hindi. 80 participants took part in the competition. The number of participants answering in Portuguese, Mandarin or Hindi is shown in the table.

		Languages			Total
		Portuguese	Mandarin	Hindi	
Participants	Boys	20	18	5	43
	Girls	18	7	12	37
	Total	38	25	17	80

State the number of boys who answered questions in Portuguese.

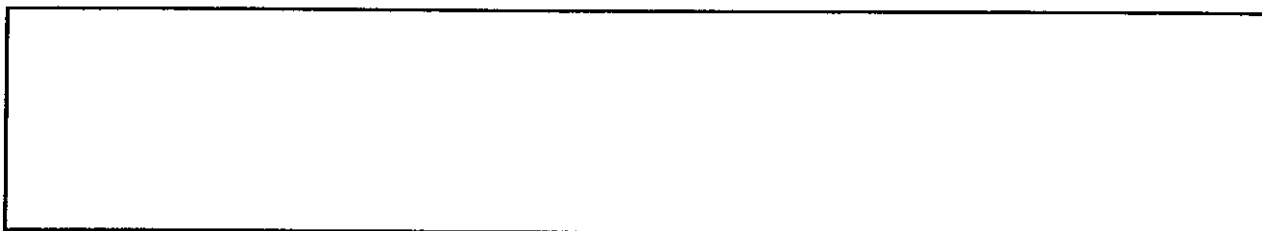
<p>20</p> <p>.....</p> <p>.....</p> <p>.....</p>
--

4b. [2 marks]

A boy is chosen at random.

Find the probability that the boy answered questions in Hindi.

<p><math>\frac{5}{43}</math></p> <p>.....</p> <p>.....</p> <p>.....</p>
---



4c. [3 marks]

Two girls are selected at random.

Calculate the probability that one girl answered questions in Mandarin and the other answered questions in Hindi.

The diagram shows a probability tree for two girls selected at random. The first girl can be Mandarin (M) with probability  $\frac{7}{37}$  or Hindi (H) with probability  $\frac{12}{37}$ . If the first girl is Mandarin, the second girl can be Mandarin (M) with probability  $\frac{12}{36}$  or Hindi (H) with probability  $\frac{7}{36}$ . If the first girl is Hindi, the second girl can be Mandarin (M) with probability  $\frac{7}{36}$  or Hindi (H) with probability  $\frac{12}{36}$ .

$$\frac{7}{37} \times \frac{12}{36} + \frac{12}{37} \times \frac{7}{36} = \frac{14}{111} \quad (\text{Use calc.})$$

Printed for Sannarpsgymnasiet

© International Baccalaureate Organization 2019

International Baccalaureate® - Baccalauréat International® - Bachillerato Internacional®