Discovering and Developing Drugs

1   Where do many of our medications originate from? How has this helped humanity?

-   From nature e.g. natural plants or microorganism
-   It speeds up drug discovery because we don't have to develop them from scratch

[2 marks]

2   What plant was aspirin originally extracted from? Give two uses of aspirin.

Plant - Willow tree

1)   Relieve/reduce pain
2)   Reduce fever or headache

[3 marks]

3   A patient with heart failure was taking digitalis. What was digitalis originally extracted from?

-   Foxgloves

[1 mark]

4   Explain how penicillin was developed

-   Alexander Fleming left some bacterial petri dishes out while he was on holiday
-   On his return he found fungal contamination and that the fungi had killed surrounding bacteria
-   He isolated a substance from the fungi that could kill bacteria

[3 marks]

5   What does penicillin do and how has this affected the world?

-   Penicillin kills bacteria
-   This had reduced the spread/incidence/deaths of infectious disease

[2 marks]
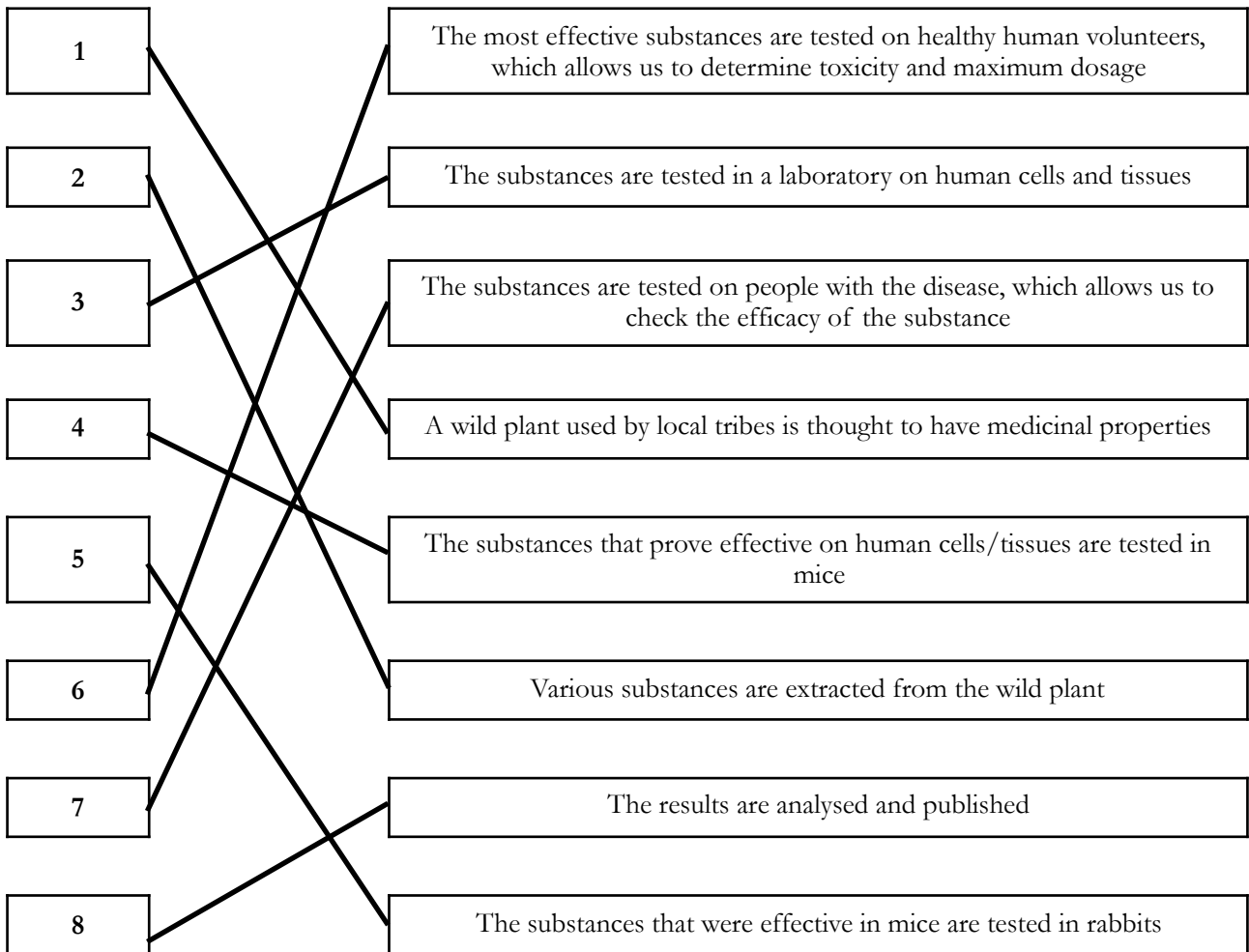
6   What do the following terms mean

Efficacy - How well the drug works and bring about the intended effect
Toxicity - How harmful the drug is e.g. how much it damages cells and causes side effects
Dosage - How much (concentration) of the drug needs to be given

[3 marks]

7   Place the following steps of hypothetical new drug in order

1		The most effective substances are tested on healthy human volunteers, which allows us to determine toxicity and maximum dosage
2		The substances are tested in a laboratory on human cells and tissues
3		The substances are tested on people with the disease, which allows us to check the efficacy of the substance
4		A wild plant used by local tribes is thought to have medicinal properties
5		The substances that prove effective on human cells/tissues are tested in mice
6		Various substances are extracted from the wild plant
7		The results are analysed and published
8		The substances that were effective in mice are tested in rabbits

[8 marks]

8   Why do we test drugs on 2 other mammals before testing in humans?

- Humans are mammals so we are quite similar to them physiologically
- So it gives us an idea about the efficacy and toxicity of the drug

[2 mark]

9   Why is a placebo and why do we use them in clinical trials?

- A placebo is a 'replica' of the drug that can be taken in the same way e.g. swallowed as a pill or injected, but it doesn't actually contain any of the drug substance
- It allows us to be more sure that any difference between the two groups is due to the drug, not due to the act of taking a pill for example

[2 marks]

10   Most clinical trials are blind or double-blind, what does this mean and why is it important?

- Blind is when the patients don't know if they are taking the real drug or placebo
- Double-blind is when the doctors don't know either
- It helps to avoid bias

[3 mark]

11   Briefly describe stages 1, 2 and 3. Which are clinical or preclinical?

Stage 1 - Preclinical - Testing on cells and tissues in a laboratory

Stage 2 - Preclinical - Testing on other animals e.g. mice and rabbits

Stage 3 - Clinical - Testing on humans (both healthy and patients with the disease)

[3 marks]

12   Why do the results of clinical trails need to be peer reviewed and what does it involve?

- Peer-review is when the results/data are analysed by other scientists before it is published
- This reduces the chance that incorrect or biased data will be published
- Which reduced the chance that an ineffective or dangerous drug will be released to the public

[3 mark]

[Total 35 marks]