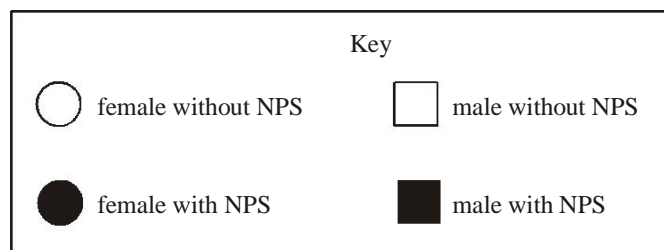
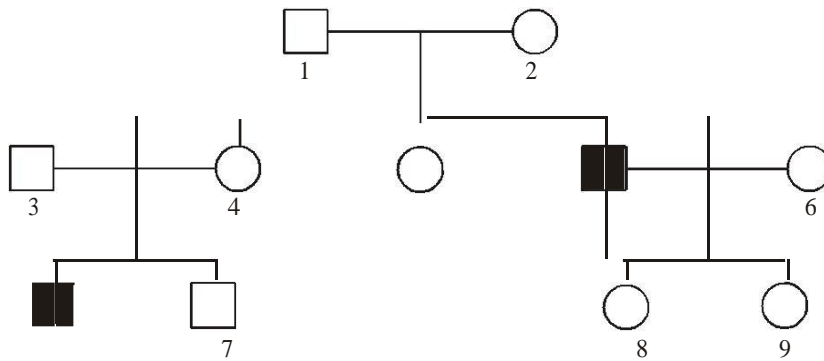


# Specimen Biology, Chemistry, Physics and Mathematics Questions

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The diagram below shows a family tree of a condition known as nail patella syndrome (NPS).



Which of the following pairs of individuals **must** be heterozygous for NPS?

- A 1 and 5
- B 2 and 6
- C 3 and 7
- D 4 and 8
- E 5 and 9

Here the correct answer is **D**.

An oxide of iron has the formula  $\text{Fe}_3\text{O}_4$  and contains both  $\text{Fe}^{2+}$  and  $\text{Fe}^{3+}$  ions.

Which one of the following is the fraction of iron ions that are in the  $\text{Fe}^{2+}$  state?

- A**  $\frac{1}{4}$
- B**  $\frac{1}{3}$
- C**  $\frac{1}{2}$
- D**  $\frac{2}{3}$
- E**  $\frac{3}{4}$

Here the correct answer is **B**.

Below are four statements about thermal (heat) energy.

- 1 A substance can lose heat energy without its temperature falling.
- 2 Heat energy can pass through a vacuum.
- 3 Steam at  $100^{\circ}\text{C}$  has more heat energy than the same mass of boiling water at  $100^{\circ}\text{C}$
- 4 When a container of water is cooled near the top, a convection current is set up in the water.

Which statements are correct?

- A 1, 2 and 3 only
- B 2, 3 and 4 only
- C 1, 2 and 4 only
- D 1, 3 and 4 only
- E 1, 2, 3 and 4

Here the correct answer is **E**.

The longest side of a right angled triangle is  $6 + \sqrt{5}$  units.

One of the shorter sides is  $3 + 2\sqrt{5}$  units.

What is the length of the third side?

- A  $2\sqrt{3}$
- B  $\sqrt{70 + 24\sqrt{5}}$
- C 12
- D  $3 - \sqrt{5}$
- E  $14 + 7.5\sqrt{5}$

Here the correct answer is **A**.