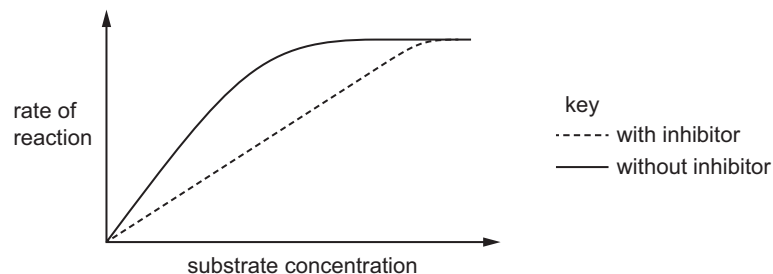


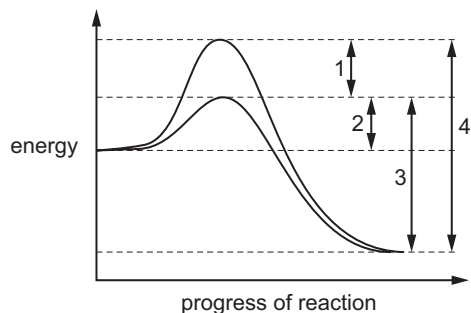
- 12 The graph shows the effect of substrate concentration on an enzyme-catalysed reaction with and without a competitive inhibitor.



What is the effect of the competitive inhibitor on $V_{\max}$ and K_m ?

- A $V_{\max}$ decreases and K_m decreases.
 B $V_{\max}$ stays the same and K_m decreases.
 C $V_{\max}$ stays the same and K_m increases.
 D $V_{\max}$ decreases and K_m stays the same.

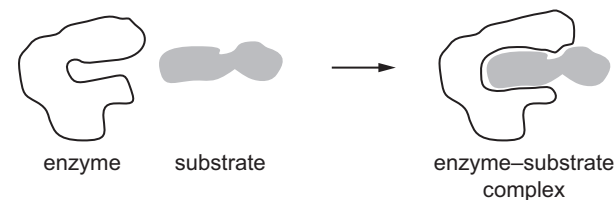
- 13 The graph shows energy changes in a chemical reaction.



What is the activation energy when an enzyme is added?

- A 1 + 2 B 2 only C 3 – 2 D 4

- 14 The diagram shows an enzyme, its substrate and an enzyme–substrate complex.



Which statement explains how this substrate is able to enter the active site of this enzyme?

- A Contact between the substrate and the enzyme causes a change in the enzyme shape.
 B The shape of the active site and the shape of the substrate are complementary.
 C The substrate within the active site forms hydrogen bonds with amino acids.
 D When the enzyme–substrate complex forms, the tertiary structure of the enzyme changes.

- 9 Enzyme P has been found in a tropical grass.

- The enzyme catalyses the hydrolysis of the fungal polysaccharide, chitin, into amino sugars.
- It also inhibits the activity of an enzyme in locust guts which catalyses the digestion of amylose.

Which row describes the actions of enzyme P?

	reaction catalysed	reaction inhibited
A	hydrolysis of glycosidic bonds	condensation of glycosidic bonds
B	hydrolysis of glycosidic bonds	hydrolysis of glycosidic bonds
C	hydrolysis of peptide bonds	condensation of glycosidic bonds
D	hydrolysis of peptide bonds	hydrolysis of glycosidic bonds

- 13 What is the effect of an enzyme in an enzyme-catalysed reaction?

- A decreases the activation energy and decreases the energy yield
 B decreases the activation energy and has **no** effect on the energy yield
 C increases the activation energy and increases the energy yield
 D decreases the activation energy and increases the energy yield

14 How is the Michaelis–Menten constant (K_m) used?

- A** to determine the number of collisions between the enzyme and substrate
- B** to compare the affinity of enzymes for their substrates
- C** to find the maximum velocity of an enzyme (V_{max})
- D** to find the optimum rate of reaction

15 Some students investigated the effect of pH on the rate of starch digestion by amylase at 20 °C.

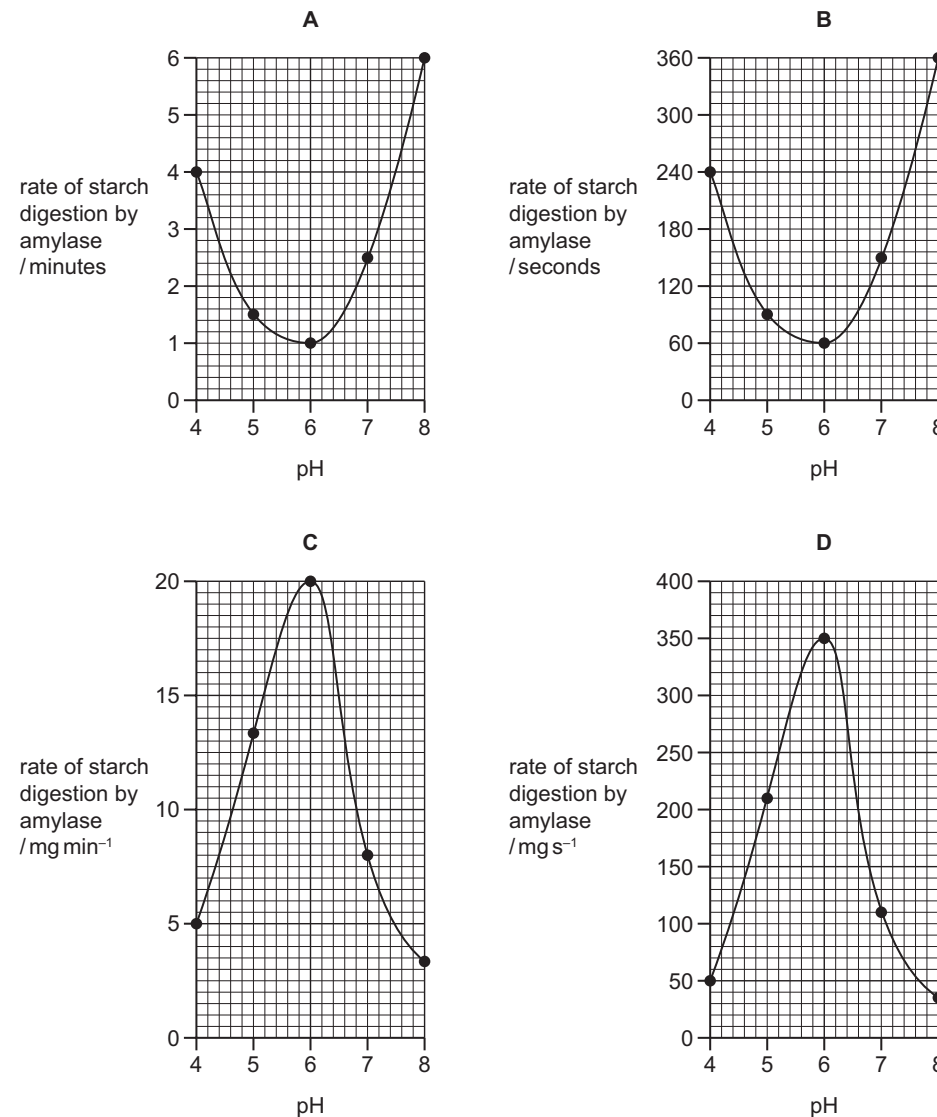
- They added 2 cm³ of a 1% amylase solution and 1 cm³ of pH 4 buffer to a test-tube.
- They added 2 cm³ of a starch solution, containing 0.02 g of starch, to the test-tube.
- They measured the time taken for the starch to be digested (to disappear).

The students then repeated these steps with pH 5, pH 6, pH 7 and pH 8 buffers.

The table shows the results.

pH	time taken for starch to be digested / minutes
4	4.0
5	1.5
6	1.0
7	2.5
8	6.0

Which graph is correct for these data?



16 Which statements are correct for a non-competitive inhibitor of enzyme action?

- 1 Increasing the concentration of the enzyme's substrate will reduce its effect.
- 2 It reduces the activation energy required for a reaction to take place.
- 3 It reduces the maximum rate of reaction.

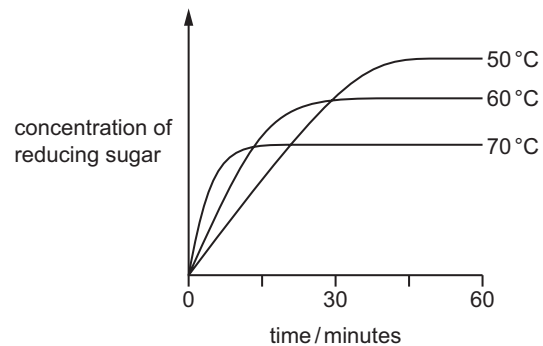
- A** 1 and 3 **B** 1 only **C** 2 and 3 **D** 3 only

15 Which descriptions of enzymes that use the lock-and-key hypothesis are correct?

- 1 The active site is complementary to the substrate the enzyme acts on.
- 2 Bonds that form in the enzyme–substrate complex change the shape of the active site.
- 3 Most of the amino acids in an enzyme help to maintain the specific shape of the enzyme.

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 3 only

16 The graph shows the results of an investigation into the effect of amylase on starch at three different temperatures.



Which statements are correct conclusions using these results?

- 1 The optimum temperature is 50 °C.
- 2 The initial rate of reaction is highest at 70 °C.
- 3 The higher the temperature the more quickly the enzyme denatures.

A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only