

Question 32 (Answer: **D**)

- Energy arrives from the Sun as light.
- Chlorophyll traps that light energy during photosynthesis.
- It is then converted into chemical energy stored in carbohydrates – so trapping comes before storing.

Question 35 (Answer: **C**)

- A pyramid of energy shows energy *per unit area per unit time*.
- So the unit must include an area and a time.
- kJ per m² per year has both; the others are missing one or the other.

4(a)(i)	grasshopper / marmot ;
4(a)(ii)	grass → grasshopper → marmots / (corsac) fox → (steppe) eagle ;
4(a)(iii)	<i>any two from:</i> <i>idea that</i> energy is lost between each trophic level ; named example of energy loss ; if less energy available then less biomass can be supported ;
4(b)(i)	<i>any three from:</i> 1 little genetic variation ; 2 increased risk of, genetic / inherited, disease ; 3 <u>inbreeding</u> / <u>inbred</u> ; 4 decreased heterozygosity / greater chance that an organism may be homozygous (recessive) ; 5 less likely to adapt to changes in the, environment / AW ; 6 increased susceptibility to (transmissible) disease ; 7 AVP ;
4(b)(ii)	<i>any four from:</i> 1 (named) protection of habitat ; 2 ref to legislation protecting species / banning hunting ; 3 monitoring / tracking / named example of monitoring ; 4 education / awareness campaigns ; 5 provision of (named), food / nutrients / veterinary care ; 6 removal of predators ; 7 removal of invasive species ;
4(c)	X – fertilisation ; Y – mitosis / cell division ; Z – im plantation ;

Question 34 (Answer: B)

- A pyramid of energy has a bar for each trophic level, drawn to scale.
- The length of each bar shows the energy stored in that level.
- The *difference* between bars shows the loss, but the bars themselves show what is stored.

Question 35 (Answer: C)

- Energy enters a food chain as *light* energy, captured by the plant.
- Photosynthesis converts it into chemical energy stored in the plant's molecules.
- From then on it is transferred between organisms as chemical energy in food.

Question 36 (Answer: D)

- Compare each level with the one before: 1000 → 100 → 10 → 1.
- Each step passes on only one tenth of the energy – about 10% efficiency.
- The rest is lost in respiration, movement and excretion, which is why food chains are short.

1(a)(i)	Sun ;
1(a)(ii)	8 ;;
1(a)(iii)	<i>any two from:</i> (energy lost as) heat / respiration ; (named other) metabolic processes ; (energy lost in) movement / muscle contraction ; not all of the organism is, eaten ; not all of the organism is digested or (energy lost in) faeces / egestion ; not every organism in that trophic level is eaten ;
1(a)(iv)	<i>any two from:</i> more <u>accurate</u> representation of energy, transfer / loss ; <i>idea of</i> accounts for (different) rate of reproduction ; <i>idea of</i> accounts for (different) life spans ; <i>idea of</i> accounts for different, sizes / body composition, of organisms ; <i>idea of</i> accounts for, time / seasonal variations ; allows (better) comparisons between ecosystems ;
1(b)(i)	area (at the same) time ;

1(b)(ii)	<i>any five from:</i> 1 (population) increases and plateaus ; 2 birth rate exceeds mortality rate / AW ; 3 plenty of (named) resources / no competition for (named) resources / lack of predation ; 4 (then) slowing / decreasing rate, of population growth ; 5 (named) resources become limited / competition for resources / increased predation / (new) disease ; 6 birth rate and mortality rate become more equal ; 7 AVP ;
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Question 34 (Answer: C)

- Energy enters almost every food chain through the producer.
- Lettuce is a green plant, so it captured the energy by photosynthesis.
- The original source is therefore sunlight.