Calculations   Marking Instructions

1. **30%**

   Working :   *9am = 6mmol/l   11am = 4.2mmol/l*

   Difference (decrease) = 6 – 4.2 = 1.8mmol/l

   % decrease = 1.8/6 x 100 = 0.3 x 100 = 30%

2. **15%**

   Working :   Fraction of energy intake used for growth = 3/20 = 0.15

   % energy intake used for growth = 0.15 x 100 = 15%

3. **7.2 millions** (units required if not written in table)

   Working :   48% of 15 = 48/100 x 15 = 0.48 x 15 = 7.2

4. **20%**

   Working :   Original yield = 35kg
   New yield = 42 kg
   Increase in yield = 42-35 = 7kg
   % increase in yield =   increase / original x 100
   =   7/35 x 100
   =   0.2 x 100
   =   20

5. (i) **80%**

   Working :   fraction of total fat which is saturated = 20g/25g = 0.8
   % of total fat which is saturated = 0.8 x 100 = 80%

   (ii) **8400**

   Working :   630kJ = 7.5% of X (where X is the total number of kJ which should be consumed daily)
   So 7.5/100 X = 630kJ
   So 0.075X = 630kJ
   So X = 630/0.075 = 8400

6. **+25** (symbol must be included)

   Working :   Change in mass = 67.5 – 54 = 13.5

   % change in mass   = change/original mass x 100

   = 13.5/54 x 100

   = 0.25 x 100

   = +25

7. **65%**

   Working :   number with mutation = 7

   Number of family members   = 20

   Number without mutation   = 20-7 = 13

   % family without mutation   = 13/20 x 100

   = 0.65 x 100

   = 65

8. **285**

   Working :   Total number of skin epithelium cells   = 250 + 330 + 275

   = 855

   Average number of skin epithelium cells = 855/3 = 285

9. **29**

   Working :   Chloride ion concentration outside = 116

   Chloride ion concentration inside = 4

   Number of times concentration greater outside = 116/4 = 29

10. **100 micrometres**

    Working :   Field of view = 2mm = 2000 micrometres

    20 cells = 2000 micrometres

    1 cell = 2000/20 = 100 micrometres

11. **4**

    Working :   Enzyme activity at pH 2.5 = 8

    Enzyme activity at pH 4.5 = 2

    Number of times more active at pH 2.5 than pH 4.5 = 8/2 = 4

12. **19**

Working :   Number of seedlings surviving in dish C   = 95% of 20

= 95/100 x 20

= 0.95 x 20

= 19

13. **15**

Working :   Total number of plants for species F

= 15+14+16+17+13+15 = 90

Average number of plants for species F

= 90/6

= 15

14. **1.3mm per minute**

*Working :   At 25°C rise in liquid level **over 20 minutes** = 26mm*

Rise in liquid level per minute = 26/20 = 1.3mm per minute

15. **150**

Working: there are 6 stomata present in 0.04mm^2 area.

To find number in 1mm^2 find out how much greater 1mm^2 is

compared to 0.04mm^2

i.e. 1/0.04 = 25

So, there will be 25 x more stomata = 25 x 6 = 150

16. **175**

Working: Non-resistant variety = 250

Beetle-resistant variety = 425

Difference = 425 – 250 = 175

17. **6**

Working: Average number of leafy lichen = 5+2+3+14/4 = 6

18. **30**

    Working: *Biomass of population = 33000g*

                   Population size = 1100

                   Average mass of 1 limpet = 33000/1100 = 30

19. **2**

    Working: *Ragwort abundance in 2011 = 15*

                   Ragwort abundance in 2015 = 5

   Decrease in 5 year period = 15 – 5 = 10

   Average decrease per year = 10/5 = 2

20. **0.01s**

    Working: *reflex action = 90m in 1 second*

                   So for 0.9m = 1/100 = 0.01

21. **36**

    Working: *Average width of leaves = 32+34+35+44+35/5*

                               = 180/5 = 36

22.   **A (increases)**

    Working: *$20^{o}C$ - 72 eggs in 24 days, so 72/24 = 3 eggs per day*

                   $25^{o}C$ - 72 eggs in 18 days, so 72/18 = 4 eggs per day

                   $30^{o}C$ – 72 eggs in 12 days, so 72/12 = 6 eggs per day

23. **0.9**

    Working: *in 60 minutes liquid moved from 10-64mm = 54mm*

                   So, in 1 minute = 54/60 = 0.9

24. **3**

    Working: *Number of lugworms at 11m = 27*

                   Number of lugworms at 7m = 9

                   Number of times greater at 11m compared to 7m = 27/9 = 3