



1. (a) if concentration is too high it will have harmful side effects /  
determination of the lethal dose (to 50 % of the population) / *OWTTE*;  
if concentration is too low it has little or no beneficial effect /  
determination of the effective dose / dose which has a noticeable  
effect (on 50 % of the population) / *OWTTE*;  
therapeutic window is the range between these doses / range over  
which a drug can be safely administered / ratio of  $LD_{50}:ED_{50}$ ;  
for minor ailments a larger window is desirable, for serious  
conditions a smaller window may be acceptable / *OWTTE*;  
(therapeutic window) depends on the drug/age/sex/weight;  
a small therapeutic window means that an overdose is a high  
risk / *OWTTE*; 4 max
- (b) placebo contains none of the compound being tested as a drug;  
placebo can “fool” the body into healing itself / *OWTTE*;  
placebo is used as a control to measure the effectiveness of a  
drug / *OWTTE*;  
half/some of trial group given placebo and half/some given drug;  
patients and administrators should not know who gets a placebo  
and who gets a drug / double blind trial; 3 max
- (c)  $LD_{50} / ED_{50}$ ;  
risk:benefit ratio;  
side-effects;  
tolerance; 1 max
- [8]
2. *tolerance*: more of the drug needs to be taken to achieve the initial effect / *OWTTE*;  
in order to achieve the desired effect heroin users may reach/exceed the lethal dose /  
heroin users are more likely to commit crimes to pay for gradually increasing doses  
of the drug / *OWTTE*; 2
- [2]
3. (a) C; 1
- (b) A / B / A and B; 1
- (c) A; 1
- [3]



4. (a) alters incoming sensory sensations / alters mood or emotions; 1
- (b) (i) the range over which a drug can be safely administered / T.I =  $\frac{LD_{50}}{ED_{50}}$  /  
ratio of the lethal dose for 50% population and the effective  
dose for 50% of population; 1
- (ii) person needs to take ever larger quantities of a drug to gain  
the original effect; 1
- (iii) therapeutic effect of an inert substance on the body / body is  
fooled into healing itself naturally / *OWTTE*; 1
- [4]
5. drug is isolated from existing species / synthesized in the laboratory;  
tested on animals to establish LD<sub>50</sub>;  
tested on humans and half/some of the group is given a placebo; 3
- [3]
6. measure of the relative margin of safety of a drug (for a particular treatment for a  
typical population) / measure for safe effective treatment;  
$$\frac{\text{lethal dose (LD}_{50}\text{)}}{\text{therapeutic or effective dose (ED}_{50}\text{)}} /$$
  
ratio of the lethal dose (LD<sub>50</sub>) to the therapeutic or effective dose (ED<sub>50</sub>) / the range  
of dosage of a drug/its concentration in a bodily system/blood;  
*Definition of LD<sub>50</sub> and ED<sub>50</sub> not required for mark.*  
wide therapeutic window exists for small effective dose and larger lethal dose /  
toxicity occurs at much higher concentrations than for successful treatment / a  
big difference between effective and lethal dose / drugs with wide therapeutic  
window are safer;  
narrow therapeutic window requires small doses as lethal dose is not large / *OWTTE*; 4
- [4]
7. (i) an effect produced in addition to the one intended / unwanted/  
undesired effect; 1
- (ii) range of a drugs concentration (in blood) between effective/ED<sub>50</sub> and toxic  
levels/LD<sub>50</sub> / (Therapeutic Index) = LD<sub>50</sub> / ED<sub>50</sub>;  
*Do not accept "difference of drug concentration".* 1



(iii) Therapeutic effect of an inert substance on the body / body is fooled into healing itself naturally / people responding positively to/psychological effect after being given a substance that is not a drug / *OWTTE*; 1 [3]

8. (i) intravenous / into veins;  
transported/pumped via blood (to various parts of body); 2

(ii) intramuscular/intermuscular/into muscles **and** subcutaneous/into fat;  
*Allow [1] if all three methods are stated in (i) and (ii) but not in correct place.* 1

(iii) inhalation/breathing it in; 1 [4]

à È9. rectally/suppository;  
inhalation;  
injection/parenterally/intravenous/subcutaneous/intramuscular;  
applying to skin/topically; 2 max  
*Award [2] for three, [1] for two.* [2]