Solutions

Marking: **M1** a correct method, **A1** the correct answer, **B1** an independent mark.

Each answer shows the steps, then the **result**.

2.1

lidocaine: **ion channel** (Na^+ channel)

aspirin: **enzyme** (COX)

fluoxetine: **transporter** (serotonin reuptake)

2.2

$15 \div 5$

TI = **3** (narrow)

2.3

most potent: **A** (and C) (lowest EC_{50})

lowest efficacy: **C**

C is a **partial agonist**

2.4

naloxone is a competitive antagonist at opioid receptors

it pushes the opioid off the receptor but does not switch it on, so breathing returns

3.1

(a) **X**: the curve moves right but reaches the same maximum

(b) **10** times

(c) X competes for the same site, so a high agonist dose wins it back; Y binds elsewhere or permanently, so fewer receptors can work whatever the dose

(d) potency stays about the same; efficacy (the maximum) falls

3.2

(a) a **partial agonist**

(b) its effect levels off at a ceiling, so higher doses add little more breathing depression

(c) it binds strongly and pushes heroin off the receptors, but gives a smaller effect, so the effect suddenly falls

3.3

(a) P: $1000 \div 10 = 100$; Q: $0.5 \div 0.25 = 2$

(b) **Q**: the toxic dose is close to the working dose, so small changes in level can harm

(c) digoxin, lithium, warfarin, gentamicin or phenytoin

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(d) constant stimulation makes the β_2 receptors fewer or less sensitive, so the same dose gives less effect (tolerance)

(e) **tachyphylaxis**