16. **Antibiotics**: only treat bacterial infections – inhibit cell processes in bacterium

Kills/stops bacteria's: DNA replication / metabolism / protein production – to slow bacteria's reproduction/growth
Prevent bacteria from making cell wall (penicillins – 1928 Fleming)
Broad spectrum: may affect useful bacteria in gut
Narrow spectrum: only affects a couple bacteria
Can't fight virus: multiplies inside cell /different structure (no cell wall)
Too much antibiotic: bacteria becomes resistant

17. **Laboratory aseptic techniques used in culturing microorganisms**

Autoclave: to sterilise growth medium & Petri dishes – kills microorganisms
sterile inoculating loops passed through hot flame – kills microorganisms
keeping petri dishes and culture vials covered
sealed: prevent other microbes entering
upside down: stop condensation falling onto agar
25˚: to grow – harmful pathogens less likely to grow

18. **Core Practical: Investigate effects of antiseptics/antibiotics/plant extracts on microbial cultures**

Grow bacteria in lab
Cultures grown in growth medium (solid agar jelly / nutrient brith solution) containing the carbohydrates/minerals/proteins/vitamins they need to grow
Bacteria grown on agar plates form visible colonies on surface of jelly
Make agar plate
Hot agar jelly poured into Petri dish
When cooled/set: inoculating loop used to transfer microorganisms to agar jelly (zig-zag motion)
Or sterile dropping pipettes & spreader used to get even covering on plate
Antibiotics: kill bacteria inside body
Antiseptics: kill bacteria outside body
Plant extracts: many plants produce antiseptics as self defence
Place soaked paper discs of different types of test substances onto agar plate with even covering of bacteria
Control disc: hasn't been soaked – be sure that effects are down to anti-biotic only (not paper)
Leave plate for 48 hours at 25˚C
Substances should diffuse into agar jelly
Antibiotic-resistant bacteria will continue to grow
Non-resistant ones will die – shown by clear area around paper discs: inhibition zone
More efficient antibiotics: larger inhibition zone

19. **Calculate cross-sectional areas of inhibition zones: πr^2**

20. **process of developing new medicines – antibiotics**

Discovery: Researchers target disease – make multiple drugs that could potentially treat it
development
preclinical testing: cells/animals
Drug tested on human cells/tissue in lab – doesn't show full effect on body systems
Live animal testing: determines safety/effectiveness/dosage – inaccurate as animal/human physiology are different

clinical testing: human volunteers
Phase 1: Healthy males: test for harmful side effects in healthy body
Phase 2: Ill patients: see if it works & determine optimum dose (most effective / least side effects)
Placebo effect: Patients in 2 random groups
1 drug / 1 placebo – substance missing actual drug
Test if people recover by just thinking they've had the drug
Double-blind trial: Patients & doctor don't know who's who until results gathered – so all patients treated equally
Phase 3: drug tested in different countries & compared to best existing treatment
medical agency approval + production
Phase 4: long term effects/benefits analysed

21. **monoclonal antibodies production**

Produced by clones of **B-Lymphocytes** to produce mono specific antibodies to target one specific protein antigen