1. Fluids
2. water in the body
   - total body water
     - 65% body weight (adults)
     - 80% body weight (neonates)
   - intracellular fluid 45% bw
   - extracellular fluid 20% bw
     - blood volume 9% bw
     - plasma volume 5% bw
   - In very fat animals these figures will be lower
3. fluid loss
   - urine 20 ml/kg/day
   - expired air 20 ml/kg/day
   - haemorrhage (not necessarily external)
   - vomiting 4 ml/kg/vomit?
   - diarrhoea 0 - huge amounts
   - not drinking
   - anaesthesia (breathing dry gas)
   - laparotomy / thoracotomy (evaporation)
4.
5. shock
   - a generalised failure of perfusion of tissues
6.
7. lat saphenous cut down
8.
9.
10. fluids available
    - oral fluids
      - water
      - electrolyte solutions

- blood
- colloids
- crystalloids

11 administration
- dose
  - as much as required
    - deficits
    - maintenance
- rate
  - as fast as needed
    - 90 - 10 ml/kg/h
- route
  - iv, po
  - ip, sc
  - intraosseus

12 monitoring effects
- central venous pressure
- pulmonary oedema
- ions

13 longer term priorities
- correct acidosis
- electrolytes
- calculate and give maintenance requirements
- treat the original problem!!

14 iv fluids
- blood
- colloids
- crystalloids
- electrolyte additives
- parenteral nutrition solutions

15 for oxygen carriage
- whole blood
  - fresh
  - ACD / CPD
- packed cells
- (perfluorocarbons)
- (haemoglobin solutions)

16 for clotting factors
- fresh whole blood
- fresh frozen plasma
- (freeze dried clotting factors)

17 for volume expansion
- colloids
- crystalloids
- hypertonic saline
- (blood)

18 colloids
- plasma
  - diy
- gelatins
  - Haemaccel
  - Gelofusin
- starches
  - hetastarch
  - pentastarch
  - dextrans

19 hypertonic saline
- NaCl 7% solution

20 for water & ions

- crystalloids
- strong electrolyte solutions

21 crystalloids
- normal saline - NaCl 0.9%
- Hartmann's solution
  - compound Na lactate, lactated Ringer's
- NaCl 0.18% & dextrose 4%
- dextrose 5%
- Ringer's solution

22 Hartmann's
- Na+ 129mM
- Cl- 109mM
- K+ 5mM
- Ca++ 2mM
- lactate 29mM
- water qs

23 concentrated ions
- potassium chloride
- bicarbonate
- calcium (boro) gluconate
- magnesium hypophosphite
- magnesium sulphate

24 for parenteral nutrition
- lipid emulsions
- amino acid solutions
- propylene glycol
- propionate
- glycerol

25 What would you do?

- dog left in car on a hot day
- now collapsed
- temperature 42˚C
- heart rate 148
- panting

26 problems
- hyperthermia
- dehydration

27 treatment
- hose down with cold water
- 5% dextrose iv
- 0.18% saline & 4% dextrose iv

28 What would you do?
- bitch spayed that morning
- now collapsed
- pale mucous membranes
- heart rate 160, v weak pulse
- panting

29 haematology
- PCV 17%

30 problems
- blood loss
- hypovolaemia

31 dog needs…
- plasma expander
- red cells
- clotting factors

32 fluids
- in emergency any iv fluid is useful for plasma expansion

- hypertonic saline is a first aid measure only
- colloids stay in blood vessels, crystalloids redistribute to other compartments
- beware overdose of K+, Mg++ and bicarb